RECORD

F.R. Fosberg 1951

SHOUT
SHARE
IT

Collection and Field Note Book

No. 30

(Oct. 10, 1951 - Dec. 22, 1951)

(33607 - 33907)

Also

* Ecological processes seen or inferred on
JEMO ISLAND

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END

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1951 Calif.

Oct. 10 — Mts of Mojave Desert - from air - no vegetation visible until rough country is reached near Cajon Pass. Then shading of brush on north slopes.

Orange groves in general valley region - Puente, Pomona & e. in very poor condition - dead twigs on almost all trees, some trees more dead than alive - great variation in condition between groves even side-by-side. some show little or no dead wood, others almost gone. Wendell S. says that it is due to lack of care - that owners think land will be subdivided. But I don't think that is the answer except locally.

Santa Ynez Mts. from air - almost entirely chaparral covered except for forest in higher ravines. Erosion scars very prominent. Dry grass areas here and there. Pine forest on a few northern crests.

nos. checked

1951 California

Labels typed HK

Oct. 14 — 2 miles south
of Hughson
cultivated sandy soil
with marshy depression

3 33607 Paspalum distichum
forming sod in marshy
depression.

2 08 Polygonum punctatum
in edge of marshy
depression

1 09 Helianthus annuus
occasional in cultivated
irrigated ground.

1 10 Eragrostis
rare in irrigated ground.

2 11 Lotus americanus
common in irrigated
ground and on ditch banks.

2 12 Digitaria sanguinalis
common in irrigated
cultivated ground

3 13 Heliotropium
occasional in cultivated ground

Stanislaus Co.

30 m.

culms ascending from
decumbent base; spikes
laterally compressed;
not eaten readily by cattle.

stems ascending,
slightly reddish;
flowers greenish-white.

herbs up to 0.8 m. tall,
branched, all leaves narrow;
rays bright yellow, disk
very dark ~~[illegible]~~ brown.

large very bushy
tangled herb, several
stems from base; flowers
pinkish white. Useful in
stabilizing ditch banks;
cattle do not eat it green,
but will as hay.

culms ascending;
eaten reluctantly by cattle.

prostrate, very glaucous,
leaves fleshy; flowers
purplish white, purple
in center; nutlets not
at all swollen or fleshy.

1951 Johnston I.

Oct. 22 – brief visit
for refueling.
Casuarina equisetifolia
has reached at least 25' tall
in residence area.
Large plants (2-3 m) of
Calophyllum inophyllum,
Terminalia catappa, Hibiscus
tiliaceus, Thespesia populnea
around base buildings
The Hibiscus, and esp. the Terminalia
are ~~slightly~~ somewhat chlorotic.
most ~~all~~ sloping surfaces,
such as bomb shelters,
etc. quite covered by a
blanket of vegetation,
Boerhaavia, Cenchrus, Eleusine,
Tribulus etc. Flat surfaces
mostly kept clean.
Many weeds, Portulaca oleracea
Euphorbia hypericifolia, etc.
around bases of buildings.
Pluchea odorata common
but not as in 1946. P. indica
common. One coconut
seedling seen.

Pluchea odorata common
locally. Euphorbia
heterophylla seen but not
collected. + apparently
does not compete well with
Messerschmidia.

1951 Wake I.

Oct. 23 – around Pan Am.
airport.
Vegetation largely a
scrub of Messerschmidia
argentea, not more
than 2-3 m. tall. Some
open areas are pure
stands of Fimbristylis,
occasionally of Ipomoea
tuba, which also
climbs over bushes.
Weeds found around
roads and buildings,
Cenchrus most common,
forming pure patches.
Heliotropium common –
dimorphism not
evident, but little
time was spent
examining it.
Fimbristylis cymosa
seems to colonize the
most extreme habitats,
such as the edges of
the airstrips.
Some marshy depressions,
perhaps artificial, along
airstrip away from
~~Ter~~ terminal.
One plover seen. Thickly
scattered billowy cumulus
clouds, one light shower
at 5 p.m.
No coconuts except seedlings.

↖

1951 Wake Island

Oct. 23 - around Pan-American Terminal

Disturbed ground around installations, coral gravel.

33614 Ipomoea tuba (Schlecht.) Don ✓
2 climbing over bushes

1 15 Messerschmidia argentea (L.f.) Johnst. ✓
dominant plant in scrub vegetation

2 16 Scaevola frutescens (Mill.) K. ✓
occasional in scrub vegetation

2 17 Dactyloctenium aegyptium (L.) Richt. ✓
local on roadside

2 18 Euphorbia
common locally along roadside

19 Fimbristylis cymosa R.Br.
very common on bare ground

1 20 Portulaca oleracea L. ✓
occasional on bare ground

1 21 Pluchea odorata (L.) Cass. ✓
locally abundant around air strips, rare near terminal

2 22 Euphorbia
occasional in edges of scrub

1 23 Eleusine indica (L.) Gaertn. ✓
occasional around buildings

1 24 Cenchrus echinatus L. ✓
common, abundant locally

2 25 ~~Helio~~ Heliotropium anomalum H.a A. ✓

extensive vine; flowers white, closed in late afternoon.

shrub 2 m. tall; leaves ~~flowers~~ fleshy; flowers white, fragrant.

rounded shrub 1 m. tall, flowers white.

dense small tufts, culms prostrate.

erect, up to 0.8 m. tall; flowers white.

dense small tufts.

prostrate, stems and leaves fleshy, bronze color.

sterile bush 1 m. tall, aromatic.

plants erect, arching at tips; flowers white.

common in bare places and openings in scrub, prostrate to erect, then 0.6 [illegible] m. tall; flowers white with yellow tube, with honey fragrance

1951 Wake Island – Iwo Jima

33626 Boerhavia ~~repens~~ diffusa ~~Forst. f.~~
3 very common

2 27 Lepturus repens (Forst. f.) R. Br. ✓
occasional

2 28 Euphorbia hirta L. ✓
local ~~on~~ bare ground

Oct. 23 – Iwo Jima
disturbed ground
around airport installation

1 29 Chloris inflata Link.
abundant

forming mats on bare
ground, prostrate.
dense tufts

erect, arching at tips.

erect, inflorescence
purplish.

1951 Japan, Honshu

Oct. 28 Mountains between Odawara and Lake Hakone

Steep slopes covered by scrub of Diervilla with plantations of Cryptomeria and Thuja. Some beech and other broad-leafed trees and pines in canyons and on slopes. upland gentler slopes and rolling country near lake grass-covered, largely uncultivated. Grass rather coarse some of grassland planted irregularly to trees. These uplands not at all thickly populated, while steeper canyons leading up to them are very thickly beset with houses. A large Selaginella of a prickly sort is conspicuous on moist rocks and cliffs.

This whole mountain mass is of mixed pyroclastic material — ash & tuff and volcanic breccia and lava flows, a part of the Fujiyama mass.

Erosion pattern is narrow vertical walled ravines and canyons. Lake Hakone is result of damming a canyon by a great landslide.

Oct. 28 Coast bet. Katase and Chigasaki, Koza-gun, Kanagawa Pref.

Dunes of dark gray sand largely planted to a 2-needled pine. These plantations not at all healthy-looking on flat parts, stunted and yellowish, but on dune ridges several times larger and dark green.

33630 Diodia teres
5 abundant on bare sand

1951 Japan, Honshu

Nov. 3 - near Sakura,
Chiba Peninsula,

33631 Miscanthus
3
abundant on steep road-cuts in deep alluvial soil.

Nov. 3 - near Sakura, rolling ground, intensively cultivated with truck crops. Surface soil very dark brown, almost black. Examined a profile here, in moist soil along roadside. Typical Ando brown rolling soil. A1 horizon dark brown, fluffy granular, silt-loam,

Nov. 3 - firing range ~~[illegible]~~ about 2½ mi. n.e. of Haramachi, Chiba Peninsula, ~~Honshu~~ slightly irregular grassland with scattered pines, small scattered shrubs.

1 32

rare, local on bare soil in

2 33 Valeriana
common in

1 34 Cassia
local in

2 35 Ligustrum
occasional in

~~Honshu~~

tangled masses, lower stems decumbent, fruiting culms ascending.

about 1 m. deep, underlain, sharply by a B of yellow-brown silt-clay-loam, heavier but somewhat friable somewhat plastic, this 1 m. ~~about~~ or more thick. A horizon about pH 8, abnormal for Ando series, but possibly due to dust from road (not too likely); B horizon sl. more acid.

Ando soil, profile examined with A horizon about 25 cm. thick, as in Sakura profile but slightly acid. B horizon as in Sakura profile, at least to 42" depth.

erect, fruits maroon purple

erect; flowers yellow, brown outside.

shrub 1 m. tall; fruit blue

33676 Quercus
common shrub in

Nov. 6 - m. south of Kobe along the seacoast, (seen from train window)

Low coastal hills show rather conspicuous erosion.
Pittosporum tobira growing spontaneously along cuts and eroded places.
Miscanthus common in waste spots at low alts.
Rice culture general. Rice being harvested. Fields ~~f.~~ vary from still somewhat green to completely ripe, harvested, in some cases even threshed. Dried by hanging.
Dwarf bamboo one of the commonest weeds. (several species)
A gnarled small pine with an almost black trunk is locally common, mostly on low hills.
The plains are almost entirely in rice, except for some truck crops.

shrub 1 m. tall, one dry fruit found in leaf axil (certainly belongs to this plant).

Hills around Kobe north of Himeji brushy and with some small forest of pine, erosion scars and quarrying scars common. Only lowest slopes usually cultivated, some indications of terracing above but apparently abandoned. Small villages, with gray-tiled roofs very common, 3-5 in sight at a glance from train window in flat valley bottoms. Transitions from hills to flats very abrupt.

South of Himeji -
Extensive rice fields. As mts are approached typical landscape is flat valley bottoms, [illegible] ~~surrounded by~~ planted to rice, ~~with~~ surrounded by abrupt steep wooded small mountains, the wood [illegible] pine in places, scrubby deciduous in others,

1951

Taller near bases of hills and in ravines, bamboo abundant in many places near bases of hills. Villages lining the edges of the valleys against the bases of the hills, in places almost continuously. Roofs generally of gray tile but many well done straw-thatch ones, the thatch very compact and 6-12" thick. Diospyros kaki very common around houses.

Ridge tops and steepest slopes covered by a thin scrub, ground showing through. Erosion scars less common. Some bare rock cliffs.

As somewhat greater altitudes are reached (700' aneroid) other conifers begin to appear. Flat valleys become smaller and less common.

Near Mantome – much rice, but also other crops. What appears to be either mulberry or ramie, growing appr. 1-1.5 m. tall, single finger thickness stems.

Several other things dried in same manner by hanging,

as is rice. Persimmons dried by hanging tied in strings on walls of sunny sides of houses.

~~South of~~ K'

West of Kurashiki the landscape changes somewhat. The hills are more gently sloping and cultivated in places to the tops, though there are patches of woods, mainly pine. Flats rice-covered. Higher hills more inland steep and wooded. A red-trunked pine is more common here than the gray-trunked one.

Citrus first noticed west of Fukuyama a few miles. Sugar cane common in garden-size patches here, too. Citrus on slopes.

Terracing in Onomichi area done in fashion that merely reduces slope, does not eliminate it. Walls with gentler slopes above them.

Near Yoshino,
Robinia pseudoacacia common on rr. cuts.
Potatoes commonly cult. east of here much rice is cultivated apparently without irrigation or with very little, on small terraces.
Palms (Trachycarpus?) ~~common~~ occasional all along this coast.
Forests on slopes mainly pine but with some deciduous trees, these just beginning to change color.
Eriobotrya very common.
Terracing intensive from here toward Hiro~~shima~~.
Many terraces irrigated by a small ditch on the upper side, at foot of wall of next terrace. Terraces mostly somewhat sloping.

Up the bay from Kure the hills become steep and rocky. The sides are mostly cliffs. But even here, in residual patches of soil are tiny terraces devoted to gardens. The soil is fine and very light colored. Even on the lower

slopes this ~~rock~~ soil is so shallow that the terraces cannot be more than a foot or two wide.
West of Hiroshima bamboo is abundant, but much of it seems to be in a dying condition. Pine dominates the landscape with bamboo an important minor feature.
Somewhat southwest of Hiroshima, near Ōnoura, I thought I saw a slope covered by Gleichenia linearis (vel aff.) but could not be certain.
South of Iwakuni the bamboo also seems yellow and dry. But could it be merely deciduous?

1951 Japan Kyushu

Nov. 8 - Fukuoka

33637 Rhus
2 in fencerow under pines
on university campus
3 38 Solidago japonica Kitamura
under pines on university campus
3 39 Litsea sieboldii
on wooded sea-cliffs
2 40 Cryptobalanopsis glauca
in park
3 41 Cayratia japonica
in small thicket under
pines on university campus

Pines are the dominant tree in Fukuoka, everywhere where there is not solidly built city. Mainly "red pine" Pinus thunbergii. ("Black pine" is P. densifolia. [~~Trunk~~ Bark of red pine may be black or red.]

shrub 1 m. tall, leaves turning orange-red.

erect, flowers yellow.

tree 8 m. tall, flowers dull yellow.
small tree 6 m. tall.

vine climbing into small trees.

1951 Japan

Nov. 9 - R.R. trip bet. Osaka and Tokyo - train window observations.

Mts. bet. Hikone 彦根 and Gifu - steep rugged mountains with flat valleys between.
(Country around Lake Biwa looks like old bed of lake now filled in & slightly elevated.
Flat land devoted to rice culture. Harvesting now in full swing. These valleys thickly populated.
Mountains steep and abrupt in the southwestern part of this stretch, slopes becoming more gentle and relief softened northward.
Southwestward these hills are pine-clad. South of the middle Cryptomeria and ~~Chamaecyparis~~ ~~Retinospora obtusa~~ Chamaecyparis obtusifolia appear and soon dominate the scene.
Cleared areas have a deciduous scrub that is changing color, but this is planted with conifers which ~~so~~ soon overtop the broad-leafed trees and shrubs.

Plains around Ogaki vast, flat, and rice-covered.
E. of Ogaki in plain are occasional ponds, some of them red with azolla.
Broad sandy river-beds ~~are~~ confined by dykes, have pioneer vegetation, occasional garden plots scattered in them.
Ficus carica common around dwellings.

Along the coast east of Nagoya are low hills of ~~allu~~ fine alluvium and some dunes.
These are mostly planted to pines, but some slopes have a dense scrub.
North of Hamamatsu the parts of these hills that cannot be terraced are covered by tea plantations. These are in small patches and the plants are mostly in low, dense, rounded box-like hedges - or low round ~~button~~ shoe-button-like ~~[illegible]~~ single plants - seemingly kept picked back too low for comfort in harvesting.

1951 Japan

The river-beds here
are very broad
with braided patterns
mostly gravel flats.

1951 Japan to Taongi

Nov. 16-24 - Boat trip on direct course from Tokyo to Taongi
No living thing seen for the whole trip except a few flying fish after the fifth day.

Nov. 25 Taongi Atoll
Inspected western islets through binoculars from ½ mile or more, approached reef near boat passage at high tide to within 50 yards.

South Islet - no vegetation visible. Islet quite rocky, mostly rock rather than sand, large
At the north end of the reef a row of large [illegible] boulders. rocks visible from well south of center of west side, through glasses.
Pokaaku Islet almost completely covered by Messerschmidia on lagoon side.

Southerly to southeasterly winds almost the entire trip. Sun only after third day.

sp. not identified - have white on top of heads, whitish wing bars (on top)
Frigate birds
common, at least 25 seen at one time.
Several fairy terns Gygis alba, and a pair of sooty terns, Sterna fuscata flew around ~~boat~~ ship.
One Dusky Shearwater (?) Puffinus l'herminieri skimming waves.
Large flock of boobies Sula sp. or spp. fishing ½ mile offshore.
One albatross, prob. Black-footed (Diomedea nigripes) flew by ship during morning.

1951 Marshall Is.

Nov. 25 - in late afternoon followed south and east coast up to north end of Kamome Islet.

South Islet absolutely devoid of vegetation, but with large boulders, some light gray, others darker, two largest black, scattered abundantly. Impossible to tell if in place or thrown up by waves.

Pokaaku I. vegetation rather sparse but large Messerschmidia rather covering islet, apparently some Scaevola, but no small bushes.

Entire south and east coast all islets characterized by a high seaward ridge or boulder rampart, and by almost continuous beach-rock or raised reef-rock, appearing about 1+ m high, variously worn away, cut into boulders here and there, and into mushroom shaped rocks on reef flat at bottom of beach.

Taongi atoll

Passes bet. two islets west of ~~[illegible]~~ Sibylla and Sibylla itself are filled till I don't think water would ever go over except in storms. These, Sibylla and next one north are well vegetated by a loose cover of Messerschmidia and Scaevola, usually extending well down on outer side of seaward ridge, but in places this bare to top. A few large boulders or exposures of beach rock on top. Large logs (Douglas fir?) here and there on beach.

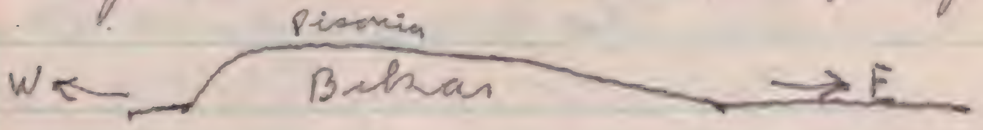
Birds occasional or common in trees and coming in from s.w. or s. usually flying fast and close to waves (boobies and sooty terns). (One white booby with white tail seen, others unident.

Kamome Islet veg. seems in poor cond. (light not good) islet is the bird rookery of the lot. - Millions of birds over it like a swarm of bees.

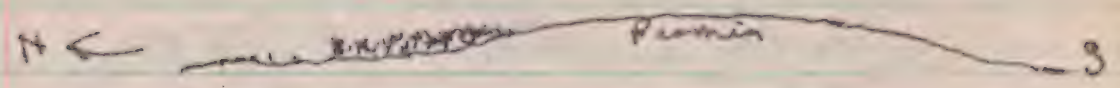
Nov. 26 - Approaching islet - met by 6 frigate birds with white heads (incl. top) and dark breasts, white belly and flanks, whitish band on upper wing coverts.

~~One~~ several Sula sula definitely ident.

All three larger islets, viewed from east, largely covered by Pisonia forest, one coconut seen on middle islet small grove on inner peninsula of Bikar I., on this a belt of Messerschmidia outside Pisonia, a few Scaevola at top of beach.



Many birds over all three islets.



Gygis very common.

Fregatta here have white heads, rusty neck, esp. throat, black breast, a white patch on belly & flanks of varying size, sometimes

with white extension up into armpits, also prolonged backward almost to anal region. White bars on wing covert areas. Bill white.

Nov. 28 – Utirik I. – s. w. corner
of island.
33644 Boerhavia diffusa v. tetrandra
5 sparse coconut grove with
~~on~~ clumps ~~scrub~~ of Scaevola.

6 42 Fimbristylis cymosa R.Br.
common ground cover
in sparse coconut grove
5 43 Messerschmidia argentea (L.f.)
component of vegetation
on recent coral sand banks

Sky largely overcast, scattered showers,
Hygr. reading 8:40 p.m.
Dry 27° C Wet 26.5° C
10:20 p.m. " 26° C " 26° C
Vial #1 – spiders on webs
spun between clumps of
bushes – orb weavers.

Vial #2 – misc. insects
caught beating Scaevola

33645 marine alga
5 on sea anemone colonies just
at low tide level on lagoon beach
5 46 Caulerpa racemosa (Forssk.) J. Ag. (det.
under and between broken
dead coral rocks in rubble
bar in lagoon at low tide mark

(Forst.) Heim. prostrate to ascending,
longer stems prostrate,
flowers pinkish. Leaves
stiff, brittle.
clumps, culms
ascending
"dralij'man" or "deralij'man"
Johnst. shrub 2 m. tall. leaves
fleshy, silvery green;
flowers white, fragrant.

brisk tradewind.

About 50 yards out from
high tide mark on the
lagoon beach is a bar
of rubble, cobble size and
smaller, some boulders,
evidently stripped from
the narrow land strip
by a storm and swept
into lagoon – very little
life except tiny sponges, a
few algae, a few echinoderms,
and many small crabs.

Taylor 1955) pale green, rhizome terete,
peltate processes tending
to be hemispherical.

1951 Marshall Is.

Nov. 29 – Utirik Islet.
Open coconut groves with grass or Tacca ground cover. Many coconut and Pandanus trees knocked down by typhoon (said to have occurred March 1951).

Vial #3 bottom layer – spotted beetles in fungi (#33655) on dead Pandanus trunk, others and spider on same trunk.

Vial #4 bottom layer and any very tiny ~~[illegible]~~ animals, any ants – in axils of dead lower leaves and green leaves just above them on Pandanus tectorius.

Vial #5 – bottom layer – fly larvae in wet decayed spot under ~~[illegible]~~ fungus (#33647) on fallen coconut trunk. Other animals – isopods, snails, under mat of ~~[illegible]~~ Thuarea at base of standing coconut tree.

Utirik atoll.

Several fungi are conspicuous on the dead and even the living fallen trees.

Vial #3 top layer (Nov. 30)
Misc. on ground – isopod. black ant running around (bites rather viciously). Solenopsis (?) attracted to food can. Big yellow ant living in thick vegetation in bottom of abandoned taro pit.

Vial #4 top layer (Nov. 30)
Coccinellids and long horned grasshopper, on Messerschmidia and Scaevola in scrub on outer part of island.

1951 Marshall Is.

33647 fungus
5 on fallen coconut trunks

2 48
on fallen coconut trunk

3 49 lichen
on standing coconut tree, upper side of ~~trunk~~ leaning trunk

3 50 lichen
on coconut trunks, very common.

5 51 lichen
on trunk of breadfruit tree

5 52 moss
on trunk of coconut tree, near base fairly common.

5 53 Eragrostis amabilis (L.) W. & A. ✓
common around trails and dwellings

5 54 fungus
on dead fallen Pandanus trunks and branches

5 55 fungus
on dead fallen Pandanus trunks and branches

2 56 Gossypium
single plant planted in village. 30 yds from lagoon

2 57 Mirabilis jalapa L. ✓
single plant growing in cemetery

2 58 Asclepias curassavica L. ✓
several plants in cemetery and around houses

Utirik atoll.

dark dull green when [illegible] moist.

dark dull green when moist
(looks like Nostoc, but with apothecia)

bright green, sterile.

loose small tufts
"ujoij" (name for grass)

brilliant vermillion;
flat.

variable but seemingly one species.

many-stemmed plant
2 m. tall, heavily fruiting;
leaves very chlorotic.

bushy many-stemmed herb, flowers white, closed when collected, just after noon.
not chlorotic.

erect herb; crown orange, corolla red. Not especially chlorotic. "yelo"

1951 Marshall Is.

33659 Ocimum sanctum L. ✓
2 small patch near house
5 60
on trunk of breadfruit tree
5 61 Ipomoea tuba (Schlecht.) Don ✓
large patch ~~on~~ ground
5 62 Euphorbia chamissonis Boiss. ✓
common locally, center of island
5 63 Eleusine indica (L.) Gaertn. ✓
common in trails and recently disturbed places
5 64 Digitaria microbachne (Presl) Henr. ✓
common around village and near trails
1 65 Cenchrus echinatus L. ✓
rather rare along trail
5 66 algae
in open pit well

Profiles #1, #2, #3

#1 in open coconut grove on path just out of village.

#2 in open grassland in middle of trail

#3 in open coconut grove on relatively high rocky ground just inside outer beach on trail

Utirik atoll.

aromatic, flowers purplish.
"katarin"

prostrate, extensive,
— flowers white (open 10:30 a.m.)
stems ascending, plant tends to be flat-topped, floral
— glands white. "mal dok"
small tufts, culms erect or ascending.
"ujoij"
small tufts, bases decumbent and rootin

---

slightly moist

Profile #1 4 samples – 1-1, 1-2, 1-3, 1-4
Surface covered with loose coral fragments, gravel size.
A horizon – layers 1, 2, 3 total 2.7'.

layer 1 – black (10YR–2/1) flecked with pale.
0–0.7'
Str. – coarse, irregularly gravelly-granular.
sample 1-1
Tex. – friable, somewhat plastic when worked.
filled loosely with grass roots.

layer 2 – black (10YR–2/2) thickly flecked with pale.
0.7–1.1'
Str. – irregularly granular, bound with coconut roots.
sample 1-2
Tex. – friable, sandy-crumbly

Marshall Is. Utirik atoll, Utirik I.
Just e. of Village
Nov. 29. 1951 Open coconut grove, grassy.

33659 Ocimum sanctum L. ✓
2 small patch near house

5 60

on trunk of breadfruit tree

5 61 Ipomoea tuba (Schlecht.) Don ✓
large patch ~~on~~ ground

5 62 Euphorbia chamissonis Boiss. ✓
common locally, center of island

5 63 Eleusine indica (L.) Gaertn. ✓
common in trails and recently disturbed places

5 64 Digitaria microbachne (Presl) Henr. ✓
common around

aromatic, flowers purplish.
"katarin"

prostrate, extensive,
flowers white (open 10:30 a.m.)
stems ascending; plant tends to be flat-topped; floral glands white. "mal dok"
small tufts, culms erect or ascending.
"ujoij"
small tufts, bases decumbent and rooting

---

sample 1-3

layer 3 – black (10YR-3/1) mottled with gray
1.1–2.7'
Str. – coarse, irregularly gravelly
a few coconut roots.
Tex. – very friable, loose

C horizon – layer 4 2.7'–4' – not dug any deeper

sample 1-4

layer 4 – very pale brown (10YR-7/3-8/3)
Str. – granular
Tex. – very friable, sandy

---

slightly moist

very few coconut roots in all horizons ex A1

Profile #2 samples 2-1, 2-2, 2-3, 2-4, 2-5, 2-6

sample 2-1

A_1 horizon layer 1
0–0.2' – black (10YR-2/1) thickly flecked with light brown.
Str. – loose granular.
Tex. – coarse foram sand, completely friable but very slightly plastic when worked.

sample 2-2

small pieces of pumice
A_2 horizon – layer 2
0.2–0.7' – salt-pepper brown (10YR-4/2-4/3) becoming lighter downward
Str. – loose granular.
Tex. – coarse foram sand, loose.

Marshall Is., Utirik atoll, Utirik Islet.
center of island S. of Village.
Nov. 29, 1951
open grassy patch in coconut grove. Lepturus.

33659 Ocimum sanctum L. ✓
2 small patch near house

5 60 ~~moss~~
on trunk of breadfruit tree

5 61 Ipomoea tuba (Schlecht.) Don ✓
large patch on ground

5 62 Euphorbia chamissonis Boiss. ✓
common locally, center of island

5 63 Eleusine indica (L.) Gaertn. ✓
common in trails and recently disturbed places

5 64 Digitaria microbachne (Presl) Hen. ✓
common around

aromatic, flowers purplish.
"katarin"

prostrate, extensive,
flowers white (open 10:30 a.m.)
stems ascending, plant tends to be flat-topped, floral glands white. "mal dok"
small tufts, culms erect or ascending.
"ujoij"
small tufts, bases decumbent and rootin

Buried A horizon - 0.7-1.8' layer 3
sample 2-3
black (10YR-2/1-4/1) becoming lighter downward.
Str.-loose granular
Tex.- coarse foram sand, loose.

C horizon - layer 4
1.8'-7' - Pinkish gray (5YR-6/2) to pink (5YR-8/3)
(upper foot pinkish gray coarsely irregularly mottled with grayer, changing gradually to pink)
samples 2-4 2-5
Str. very loose granular at 5' becoming irregularly partially hard-caked (sample 2-5), roots to 5'.
Tex. - coarse foram sand. loose to hardcaked.
C horizon - layer 5 - below 7' on a test, - wet small gravel (sample 2-6)

---

slightly moist

loose coconut roots in all layers more in layer 2

Profile #3 (anomalous - series of buried profiles) Surface with irregular fragments
Samples 3-1, 3-2, 3-3, 3-4, 3-5.
Layer 1 - 0-1.3' - salt + pepper (5YR-8/2, 5/1, 3/1, averaging 6/2) pinkish.
sample 3-1
Str. granular Tex. loose sand with irregular coral fragments
1st
Buried profile - layers 2 + 3.
sample 3-2
Layer 2 - 1.3-1.9' - (10YR-3/2)
Str. granular, sl. firmer than other layers.
Tex. loose sand with irregular coral fragments.
sample 3-3
Layer 3 - 1.9-2.3' - (5YR-8/2)
Str. granular
Tex. loose sand with irregular coral fragments
2nd
Buried profile - layer 4 - 2.3-3' -
sample 3-4
(5YR-8/2) darkened a little at top.
Str. granular
Tex. loose sand with irregular coral fragments.

Marshall Is. Utirik atoll, Utirik Islet
S. of village near ocean beach, just inside height of land, 11' above beach-rock.
Nov. 29, 1951 - Open coconut grove, grassy.

1951 Marshall Is.

33459 Ocimum sanctum L. ✓
2 small patch, near house
5 60 moss
on trunk of breadfruit tree
5 61 Ipomoea tuba (Schlecht.) Don ✓
large patch on ground
5 62 Euphorbia chamissonis Boiss. ✓
common locally, center of island
5 63 Eleusine indica (L.) Gaertn. ✓
common in trails and recently disturbed places
5 64 Digitaria microbachne (Presl) Hen. ✓
common around

Buried profile – layer 5
3 – 4.5' (then coral fragments became so numerous and hard packed that digging became impractical)

[illegible] 3-6

gray (5YR – 5/1) becoming lighter downward, irregularly mottled or splotched with pink (5YR – 8/2 – 8/3)
St. rather hard-packed, crumbly.
Tex. sandy rubble with irregular coral fragments.

large cobbles and even a few boulders scattered through this entire profile.

Utirik atoll.

aromatic, flowers purplish. "katarin"

prostrate, extensive,
flowers white (open 10:30 a.m.)
stems ascending, plant tends to be flat-topped; floral glands white. "mal dok"
small tufts, culms erect or ascending.
"ujoij"
small tufts, bases decumbent and rooting, culms erect. "ujoij"
small tuft, culms ascending "lekelek"
green, submerged and floating.

± 200 yard diam. circle, open coconut grove, incl. ~~#~~ profile #3, has 120 standing coconut trees, 47 knocked down by typhoon, all pointing s. to s.e., no young trees less than 2 years old. ± general level about 11 ft. above edge of beach rock. Trees formerly spaced 15-20'. ~~Do~~ Uneven mat of Lepturus, some Digitaria, some Fimbristylis, a few Pandanus, most of large ones knocked down by typhoon.

Nov. 30 – Utirik Islet

Soil profile #4 taken near s.w. end of coconut grove, slightly nearer outer than inner beach, (in the grove). The three layers here probably have no relation to each other – probably represent three depositions of material. The total depth of loose material on reef-rock is not great.

Beyond the end of the grove the loose material has been swept away by the 1951 typhoon (my guide confirms that the water came up over the flat part of the island.) Root systems of shrubs are exposed – very extensive.

Soil profile #5 is from toward the center of the island directly east of center of village, in sparse coconut grove, ground covered by grass (Digitaria), Tacca, and abundant Euphorbia chamissonis. Soil here is also shallow, but upper two layers perhaps

slightly moist

Some coconut roots in all layers

Profile #4 hole dug 3.2' to surface of reef-rock. anomalous profile.

Sample 4-1

Layer 1 – 0–1.6' reddish gray (5YR–5/2) with some fine black (5YR–3/1), varying to blotches of light reddish brown (5YR–6/3)

undifferentiated except that coconut roots are more abundant in bottom 0.3', grass roots common in top.
Str. – granular, loose.
Tex. – ~~loose~~ sandy with irregular coral fragments, (many of pebble or even cobble size in bottom of layer).

Sample 4-2

Layer 2 – 1.6–2.2' pinkish gray (5YR–6/2)
St. – crumbly, firm.
Tex. – loamy sand with some gravel.

Marshall Is., Utirik atoll, Utirik Islet, inside of but near w. end of coconut grove, nearer outer than inner beach
Nov. 30, 1951 Open coconut grove, grassy, some bushes.

Sam
cora
upp
Layer 2.
St.
Tex
sample 5-2:
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Nov. 30, (
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Tar pit bo
level of
Water samp

42 1951 Marshall Is.

Layer 3. – 2.2–2.5' pink (5YR–8/3)
sample 4-3
Str. firmly packed, crumbly.
Tex. very friable, fine sand with
some coarser particles.

Layer 4. 2.5–3.2' mixed pinkish grays
averaging about 5YR–7/2
sample 4-4.
Str. loose, not well packed.
Tex. gravel with some coarse sand

water came up over the
flat part of the island.)
Root systems of shrubs
are exposed – very extensive.

Soil profile #5 is from
toward the center of the island
directly east of center of
village, in sparse coconut
grove, ground covered by
grass (Digitaria), Tacca,
and abundant Euphorbia
chamissonis. Soil here
is also shallow, but
upper two layers perhaps

Utirik atoll. 43

are really horizons of one
~~to~~ depositional layer.
Bedrock here seems to be
indurated loose material
rather than reef-rock.
In this area are a number
of elongate depressions or
trenches, about 10 m. wide,
2 m. deep, that are doubtless
long-abandoned taro-pits.
They are said to have been
made by the old people.
They are old enough to
have coconut trees at the

slightly moist

Profile #5 3 layers totaling 2.5'

Layer 1. 0–0.7' black (10YR–2/2)
sample 5-1
Str. – loose granular, very friable
Tex. – loamy sand with a few small
coral fragments, grass roots in
upper part, a few coconut roots.

Layer 2. 0.7–1.5' gray-pink (7.5YR–6/4)
blotched with a salt & pepper
mixture of 10YR–3/1 and 6/2,
appearing gray.
Str. – loose granular.
Tex. – coarse sandy with some
coconut roots.
sample 5-2 :
passing gradually into layer 3

(over)

Marshall Is. Utirik atoll, Utirik Islet.
along trail east of Village; 140 m. S. of last
Japanese installation.
Nov. 30, 1951 Sparse coconut grove, ground cover
of Digitaria, Euphorbia cham. + Tacca [illegible] high

Layer 3. – 2.2–2.5' pink (5YR–8/3)

Sample 4-3

Str. firmly packed, crumbly.

Tex. very friable, fine sand with some coarser particles.

Layer 4. 2.5–3.2' mixed pinkish grays averaging about 5YR–7/2

Sample 4-4.

Str. loose, not well packed.

Tex. gravel with some coarse sand

Layer 3 1.5–2.5' pink (7.5YR–8/4) blotched above with gray (as in blotches in layer 2)

Sample 5-3

Str.– loose granular.

Tex.– foram sand, with a few coconut roots.

resting on a consolidated small gravel that is pink, very firm to pick, but after pieces are detached they crumble somewhat. coconut roots penetrate this.

Sample 5-4

are really horizons of one ~~to~~ depositional layer. Bedrock here seems to be indurated loose material rather than reef-rock.

In this area are a number of elongate depressions or trenches, about 10 m. wide, 2 m. deep, that are doubtless long-abandoned taro-pits. They are said to have been made by the old people. They are old enough to have coconut trees at the

Profile #6 3 layers in bottom of long-abandoned taro pit. A-C

moist

Dec 1 surface temp 82°F

Layer 1 0–1.9' black (10YR–2/1–2/2) becoming somewhat lighter downward, somewhat flecked with pale grains.

Sample 6-1

Str. crumbly-granular

Tex. mucky loam with some coarse sand, plastic when worked. roots in upper 1/3.

Layer 2 1.9–2.5 gray (10YR–4/1) thickly flecked with pale brown (10YR–7/3)

Sample 6-2

Str. sticky granular (wet), firm.

Tex. coarse sand with some clay and much small gravel and some irregular coral fragments

Marshall Is. Utirik atoll, Utirik Islet east of village on trail, 200 m. E. of last Japanese installation.

Nov. 30, 1950. Clerodendrum thicket in bottom of old abandoned taro pit.

Layer 3. – 2.2–2.5' pink (5YR-8/3)
Sample 4-3 Str. firmly packed, crumbly.
Tex. very friable, fine sand with some coarser particles.

Layer 4. 2.5–3.2' mixed pinkish grays averaging about 5YR–7/2
Sample 4-4. Str. loose, not well packed.
Tex. gravel with some coarse sand

very wet Layer 3 (C horizon) 2.5–3.2' (to bottom of hole) pale brown (10YR – 7/3)
Sample 6-3 Str. hard, firmly packed.
Tex rubble with some sand, pieces of coral to 3–4" thick.

Encountered water in C horizon, at about 3'; very strongly smelling of H_2S, peculiar sweet taste, 83°F temp. as it collected in hole; rose to 2.3' in 2 ½ hours.
(below level of bottom of taro pit)

Taro pit bottom perhaps 6 ft. below level of surrounding country

Water sample marked 6—4

are really horizons of one ~~to~~ depositional layer. Bedrock here seems to be indurated loose material rather than reef-rock.

In this area are a number of elongate depressions or trenches, about 10 m. wide, 2 m. deep, that are doubtless long-abandoned taro-pits. They are said to have been made by the old people. They are old enough to have coconut trees of the general size in the surrounding plantation growing in their bottoms, also fair sized breadfruit trees.

Profile #6 was dug in the bottom of one of these, now filled with a thicket of Clerodendron. The soil was black, and the water table is only 2.3' below the ground. The water smells very strongly of H_2S.

Beyond here, to the east, is a large area of open coconut grove with Tacca making up a large part of the ground cover, otherwise grass and, locally, Euphorbia chamissonis.

The eastern part of the ~~atoll~~ islet is open coconut grove with grass. Before the grass is reached there is a small thicket of Cordia, Guettarda, and Pisonia, almost smothered by Ipomoea tuba.

On the east end of the islet is an area of broken coral, with no obvious soil. This is mostly covered by a scrub of Scaevola, dense and tangled, 2-3 m. tall at inner edge, getting lower outward, badly battered by the typhoon at outer edge, with, scattered through it badly beaten old trees of Messerschmidia, Pisonia, Guettarda, Cordia, etc. about twice as tall as the scrub. In the scrub are many dead branches of these lying tangled in the scrub. This scrub is so dense that it is laborious to cut a trail through it. It is also tangled with Ipomoea tuba.

On bare broken coral inside this belt of scrub was found a colony of Fleurya ruderalis, also much Boerhavia diffusa of the extensive, pointed leafed, capitate infl. form.

Two species of lizards noted on island - a small slender brown skink, and a large, swift-like green one, up to 8" long. a series ~~One~~ of these latter were ~~was~~ secured and is in jar #1.

In jar #1, also are two specimens of the large red terrestrial hermit crab; ~~three a~~ four of a smaller white and purple banded one; and two specimens of a burrowing land crab or "ghost crab" of a very pale color, dug out of burrows in the sand flat of the west part of the island. The hermit crabs were eating meat from split young drinking coconuts.

— Vial #7 - has earthworm from upper layer of profile #6. Lost

In jar #2 are a number of hermit crabs, one land-crab and some skinks.

1951 Marshall Is.

33667 Guettarda speciosa L. v
5 common in ~~the~~ sparse coconut grove and in scrub along outer edge of islet

3 68 Suriana maritima L. v
common in scrub on outer part of islet, outside coconut area, on coral debris.

5 69 Leucaena glauca (L.) Benth. v
very local, around old Japanese installation, center of west arm of islet.

2 70 Carica papaya L. v
common, this from near center of west arm of islet.

2 71 Cordia subcordata Lam. v
~~common~~ occasional in sparse coconut groves, sometimes forming small thickets.

3 72 Euphorbia heterophylla L. v
very local, ~~one colony seen~~ abundant where seen, around abandoned dwelling sites

5 73 Clerodendrum inerme (L.) Gaertn. v
common in center of islet, especially around abandoned taro pits, forming low thickets.

2 74 Polypodium scolopendria Burm. f. v
in small pit around old Japanese installation, not seen elsewhere

5 75 Portulaca samoensis v. Poelln. v
common in sparse coconut groves in center of islet~~s~~ on bare ground.

Utirik atoll

shrub 2 m. tall, bushy; (others seen up to 5 m. tall); flowers white, very fragrant. "wut"

low shrub, spreading; flowers yellow, petals falling easily.

shrubs 3-4 m. tall flowers cream-white.

plant 3 m. tall, flowers cream white.

shrub 3 m. tall; all seen sterile. "kāno"

bracts partly scarlet.

shrub 1-1.5 m. tall; flowers white, with maroon-purple stamens and style. "ulij"

prostrate, fleshy; root tuberous; flowers yellow, closing before mid-day.

1951 Marshall Is.

33676 Pisonia grandis R.Br. ✓
4 scattered in Scaevola scrub on outer part of north end of islet.

3 77 Ipomoea tuba (Schlecht.) Don ✓
common, tangled in inner edge of Scaevola scrub on north end of islet.

3 78 Calophyllum inophyllum L.
rare, one tree seen near center of island.

6 79 Fleurya ruderalis Gaud. ✓
Local on bare broken coral just inside belt of Scaevola scrub on north end of island.

5 80 Boerhaavia diffusa L.
common on bare broken coral just inside belt of Scaevola scrub on north end of island

Dec. 1 - same.

9 81 Lepturus repens (Forst.) R.Br. ✓
one of first colonists on bare coral sand (also dominant ground cover under coconut trees in outer parts of coconut grove)

5 82 Pemphis acidula Forst. ✓
in mixed scrub on sand spit (small dunes)

2 83 Artocarpus altilis (Park.) Fosb. ✓
planted in village

Utirik atoll

tree 5 m. tall, 15 cm. thick; leaves pale green; all seen sterile.

vine, extensively twining, climbing in shrubs and trees.

stems succulent, red.
"nene kutekut"

prostrate, forming extensive loose mats; flowers pink.

bunches of erect culms, sending out long prostrate creeping runners or stolons.
"ujoij"

shrub 1.5 m. tall, leaves salty astringent to taste; flowers white.

tree 6 m. tall, sterile at this season; said to be seedless variety. "mā"

1951 Marshall Is.

5 33684 Morinda citrifolia L. v
very common in open coconut groves

2 85 Nerium
planted in village

2 86 Crinum
abundantly planted in village

2 87 Sida fallax Walp. v
single plant planted in village

6 88 Phyllanthus niruri L. v
common locally in village

2 89 Plumeria rubra L. v
planted in village

5 90 Pseuderanthemum carruthersii (Seem.) Guill.
planted in village var. carruthersii

4 91 Artocarpus altilis (Park.) Fosb. v
planted in ~~village~~ coconut grove

5 92 Thuarea involuta (Forst.) R. & S. v
common locally in coconut grove

6 93 Triumfetta procumbens Forst. v
abundant locally in coconut grove

5 94 Cassytha filiformis L. v
common generally parasitizing herbs & shrubs

Utirik atoll

"meni" shrub 3 m. tall. leaves
— glossy; flowers white.
sterile shrub 3 m. tall.

neck up to 3 dm. high,
1-1.5 dm. thick, plant
up to 2 m. tall; peduncles
red, somewhat compressed;
flowers white with
maroon tube & stamens,
very fragrant. Pedicels
— thick, 2-2.5 cm. long. "kiep"
shrub 1 m. tall; leaves
— green; flowers orange.
erect; flowers green.

rounded shrub or small
tree 2.5 m. tall, flowers
white with yellow center,
— fragrant.
small tree 3 m. tall; leaves
green; flowers with
salverform corolla, white
with red-purple center,
2 lobes erect, one down, two
"ulij" — lateral ones below horizontal.
tree 5 m. tall, sterile at this
— season; said to be seeded variety. "mā"
prostrate, forming loose
— mat. "ujoij" (means grass)
prostrate, extensive creeper
— branches ascending, flowers yellow.
stems green (to yellow in
some places), flowers white, fruit ~~[illegible]~~ immature.

33695 Tacca leontopetaloides (L.) O.K. ✓
locally dominant in ground cover in sparse coconut grove. Seedlings abundant.

96 Premna obtusifolia R. Br. ✓
two trees seen, near village on lagoon side of islet

97 Pandanus tectorius Park. ✓
common generally

Took samples of water flowing from beach in small springs just above low tide mark. This is salty. Also took water samples from two ~~[illegible]~~ pit wells, one about 100 m. from beach, other about 50 m. on lagoon side of island.
Two samples marked UW-6 and UW-7 are from beach, UW-6 taken at low tide, UW-7 1/2 hour later. UW-8 from 100 m. back of beach at this point; UW-9 from 50 m. back, but much farther west.

98 ~~alga~~
algal crust on soil in coconut grove.

acaulescent, scapose, up to 2 m. tall, at this season turning quite yellow; fruits ripe. Tubers used to make starch. "makmok" seedlings included in specimen.

small tree, leaves badly eaten by insects. sterile. "kaar"

tree 5 m. tall, pulp of fruit eaten. "bōp".

~~[illegible]~~ Vial #6 - bottom layer has damsel flies from around pit well, house flies that are everywhere.

Vial #10 - miscellaneous. Elaterid flying to light at night - Utirik Islet. Pseudoscorpion, mite, and isopod in litter samples ~~fr~~ #9+8 from Eekuk I.

1951 Marshall Is.

Bigarak

Dec. 2 - Pigawak Islet, South part of islet planted to coconuts. This part has sandy & gravelly soil, upper layer black or at least fine material black. Ground cover mostly Lepturus.

Just east of the south point is a small mangrove depression with Bruguiera conjugata, water rather muddy because stirred up by pigs. Water sample UW-10 taken here.

No weeds or cultivated plants noted on this islet.

Outer part of island of sharp broken coral, pieces small on inner side, coarse on outer. Along concave passage beach is a very well developed ridge of sharp broken rock, not at all vegetated on the outer slope and on the broad (5-10 m.) top. Only one or two plants of Triumfetta have gained a foothold on the outer part of this, Scaevola in a few places, Lepturus where sand has accumulated.

On outer reef there is evidence of a former reef (see p. 55)

Utirik Atoll

Eeluk Islet - coconuts sparsely planted on inner end of islet, with considerable Pandanus. Open ground under trees with Lepturus. Soil here relatively fine, but with considerable gravel sized material.

Remainder of islet covered with mixed scrub with Pisonia and Scaevola predominant, outer beach fringe with considerable Suriana, growing on cobble ridge. Small openings with Achyranthes abundant. Butterflies very common here visiting Achyranthes flowers.

Inside this is mixed scrub with considerable Pisonia. Between scrub and coconut grove is narrow open strip, grassy. Much Pisonia in scrub at inner edge.

most of which has been cut away, but which still exists, to a height of 3-4 feet just under the boulder rampart.

The inner end, 1/4 or 1/5 of the concave passage beach, is of sand, and here is beach-rock, strike parallel with beach, dipping toward passage. The beach above this is of fine calcareous sand (sample 7). It is being blown away exposing Scaevola roots. The only plants growing on the actual beach slope are few scattered Triumfetta procumbens.

In this sand are occasional small pebbles of pumice, these in most cases completely enveloped in a casing of small Scaevola roots.

The general broken rock surface is covered by mixed scrub, largely Scaevola, but with Guettarda, Messerschmidia, Pisonia, and Terminalia samoensis. The secondary components become more abundant toward the outer end, but on the actual outer beach is a broad fringe

of mostly Scaevola, this only about 1 m. tall or less, while the general scrub is from 2 to 4 m. tall, with occasional trees, mostly Pisonia but some Messerschmidia and some Guettarda 5-7 m. tall.

Vial #8 - Misc. insects taken sweeping, mostly on Pigawak Islet
(Geophilid on Eeraik Islet.)
(Cerambycid on Eeluk Islet)
(Lygeid on Pigawak I., on Allophyllus.)
(large moth larva on Pisonia on Eeluk Islet)

Vial #9 - Misc. animals collected in leaf litter on ground on Eeluk Islet.

Screening samples: Eeluk Islet:
#8 - from approx. 1 sq. yard of litter under Pandanus.
#9 - from approx. 1 sq. yard of surface in Lepturus grass under sparse coconut.
#10 - from approx. 1 sq. yard under Pisonia. Living snails in vial from decaying Pisonia twigs on ground

1951 Marshall Is.:

Dec. 2 - Eeluk Islet

33699 Suriana maritima L. ✓
5 outer fringe of scrub on outer beach
33700 Ipomoea tuba (Schlecht.) Don ✓
5 very abundant on south passage beach, on rubble and climbing over scrub.
5 01 Portulaca lutea ? Sol.
small colony on bare coral gravel near inner beach.

Dec. 2 - on reef flat in passage bet. Eeluk and Pigowak Islets.

3 02 ~~alga~~ Neomeris vanbosseae Howe (det. Taylor
very common at about extreme low tide level
1 03 Liagora? valida Harvey (det. Taylor 1955)
rare at about low tide level
1 04 Microdictyon okamurai Setch. (det. Taylor
rare at low tide level
1 05 ~~alga~~ Centroceras clavulatum (C. Ag.)
on tufts of Caulerpa at extreme low tide
3 06a Caulerpa serrulata (Forssk.) J. Ag. (det.
very common on bare rock at extreme low tide level
06b Caulerpa urvilleana Mont. (det. Taylor 1955)
5 07 Bryopsis
very common on tufts of Caulerpa at extreme low tide level
3 ~ 08 Porolithon gardineri (Fosl.) Fosl. f. gardineri
living fragments on reef flat ~~Bd.~~ just below low tide level

Utirik atoll.

~~low sh~~
low shrub ~~[illegible]~~ 1 m. tall,
— flowers yellow "ngienge"
prostrate and twining, flowers white, calyx fleshy just before maturity "maralap"
— (seeds coll. for Taylor)
stems up to 15 mm. thick, gray brown, ascending; leaves fleshy, obovate; flowers yellow, ~~stamens~~ 1 cm. across, stamens 15-20; "purya"

1955) whitish green, clavate-terete.

1955) green

Mont. (det. Taylor 1955) reddish.
level
Taylor 1955)
prostrate rhizome with
— tufts of compressed green processes.
yellowish red.

det. Doty bright rose pink

1951 Marshall Is.

Bigarak

Dec. 2 Pigawak Islet

33709 algae (blue-green)
2 in cavity in fallen Pisonia trunk

5 10 Allophyllus timorensis (DC.) Bl. ✓
colony in mixed scrub on broken coral

7 9. 11 Premna obtusifolia R.Br. ✓
one plant seen in coconut grove

5 12 Bruguiera conjugata (L.) Merr. ✓
small colony in low spot near south point. not seen elsewhere.

5 9 13 Terminalia samoensis Rech. ✓
occasional in mixed scrub.

5 9 14 Achyranthes velutina H.&A. ✓
~~small~~. two small colonies seen, (much more abundant on Eekuk I. in openings in scrub) in edges of scrub, on broken coral.

Utirik atoll

shrub 1 m. tall (others to 2 m.) diffusely branched, flowers white.

— diffusely branched shrubby tree 4 m. tall, branches to ground; flowers pale green, aromatic. Leaves varying in serration.

— small trees 2-3 m. tall; ~~flowers red~~ calyx red, petals tan. "chong"

shrub 1 m. tall (taller plants seen, also when on edge of beach, very depressed ones); fruit green.

— spreading, sprawling plants, repeatedly branched, floral bracts bright purple.

Dec. 3 Utirik Islet
sand spit with
low dunes

33715 Scaevola frutescens (Mill.) Krause
5"

2 16 ~~under loose b~~
under loose bark of dead stub
of living Messerschmidia

2 17 Laurencia sp. (det. Taylor 1955)
floating in lagoon

2 18 ~~algal layer~~
algal layer in surface
layers of beach rock

3 19
algal crust on coral sand

Several lines of beach rock dipping toward sea, then flat reef-rock, this quite impervious and hard except where cracked. Then one line dipping toward lagoon, then sand bar or spit a foot or two higher than reef rock. The rock apparently exposed during 1951 hurricane, which almost completely denuded this part of the islet.

shrub 2 m. tall, branched and spreading; flowers dirty white; fruit white, fleshy. "kånnat"
white, fleshy.

red.

green layer.

black, broken into small blocks.

Vial #11 - larvae of a moth, eating flowers and, to a less extent, leaves of Messerschmidia.

Vial #12 - Miscellaneous insects collected on Messerschmidia argentea.

The proximal part of this denuded ~~d~~ rock flat has scattered clumps of Pemphis, some very dense, with scattered tufts of Lepturus between, some Cassytha and a few other plants. ~~[illegible] distal spit~~ Dead bushes of Scaevola with their enormous root systems exposed are common on the proximal part, toward the sea, apparently killed by the March, 1951, typhoon, which swept much of the rock clear of soil.

Distal to a break ~~at~~ in the beach-rock, where the sea comes in at high tide to form a large pool, there is almost no vegetation on the rock-flat (a plant or two of Pemphis, only), but a line of Scaevola scrub (with some Messerschmidia) runs on out along the crest
(3) of the sand spit. The bushes are well grown, 2-3 m. tall, and small trees of Messerschmidia may be 4 m.

along the lagoon side of this spit are two levels of deposited material one just
(2) below the crest, firm level sand, with a slight algal crust, and beginning to be revegetated with Scaevola and Lepturus. Between this and the water's edge is actual
(1) beach, of fine gravel, which is loose. Here are many tiny seedlings of Messerschmidia. All three of these belts are cut here and there by places where the waves have actually gone over and washed vertical sided gaps a foot or two into the sand ridge, exposing the root systems of Scaevola.

Counts of relative numbers of ~~[illegible]~~ various plants present as seedlings a adult plants were made along a stretch that seemed typical. Areas were not measured, so the percentage composition is the only significant factor here.

1951 Marshall I.

		1	2	3
general	Scaevola	3	~~4~~ ~~110~~ 131	~~13~~ 21
general	Messerschmidia	118	3	5
general	Lepturus	13	95	
	~~Fimbristylis~~			
local	Fimbristylis			
scattered	Suriana			
rare ex. as seedlings	Guettarda		11	
rare	Pandanus			
absent from sand	Pemphis			
rare common around?	Cassytha			
scattered	Triumfetta		5	

The exposed beach rock has a green algal layer a few mm. below the surface, esp. where the rock is gray rather than white

Dec. 4 – Lagoon – saw white tailed tropic bird flying above boat.

Golden Plover seen generally, on all islets. Very tame here, run with chickens, only fly up on close approach of a person. "kolej"

— The coconuts, in general, are very small here, variable but averaging small.

Utirik atoll.

Dec. 2 – Eeluk I. – a great crowd of fairy terns in air when I was in brushy part of islet. The egg of one of them was seen, lying on a dead stub of a branch of a Messerschmidia tree, balanced in a slight irregularity. It was mm. long, mm wide, ground color a pale brownish gray, irregularly mottled with brown-gray, brown, and very dark brown.

Hypolimnas bolina (♀) very common here two main color forms and some variation in these. Visiting Achyranthes velutina flowers.

Native name for fairy tern is "mejo'k"

Large animals
Man "kånono"
Dog
Pig "big"
cat "guj"
chicken "pau", or "pau"
rat – reported by natives, not seen.

1951 Marshall Is.

Dec. 5 Taka I.
Lagoonward half in coconuts, more densely planted toward lagoon sparser toward center of island (E. & W.).
Surface soil in part covered by coconuts sandy, mostly not very dark in color except at extreme surface.
Profile # 11 in small grassy opening in this section.
Central part of island scrub with a few scattered coconuts, and, in southern half, with open Pisonia forest. Profiles 12 & 13 in scrub, 13 in Scaevola 12 in mixed Messerschmidia, Scaevola, Guettarda.

In coconut plantation scattered clumps and patches of Scaevola brush, masses of young coconuts, scattered Pandanus, ground cover of Triumfetta, Polypodium, Cassytha, Lepturus, very luxuriant, the Triumfetta sending up erect branches

Profile # 12 0-4.3' three layers.

Sample 12-1

Layer 1. - A₁ horizon - 0-0.9' dark brown (7.5 YR - 3/2) but larger particles as light as 7.5 YR - 5/2 or 6/2 F. at top becoming gradually darker. ~~sand~~
Str. loose granular, lighter, fluffier at top.
Tex. loamy sand, more organic matter toward top.

changes gradually to

Sample 12-2

Layer 2 - A₂ horizon. pinkish gray (7.5 YR - 6/2) 0.9 - 1.5'
Str. fairly compact but easily crumbled.
Tex. sand mixed with fine silt.

changes gradually to
(over)

Marshall Is. Taka atoll, Taka I.

Dec. 5, 1951 grassy opening in mixed scrub.

from the prostrate stems, abundantly floriferous, flowers opening late in afternoon. Cassytha forms large dense mats.

Well in this section - water temp. 81° at 10:35 a.m.

Outer third of island uneven mixed scrub, with grassy openings in north part, dense in south part, many fallen trees.

sample 12-3

Layer 3 C horizon. 1.5'-4.3'. pink (7.5YR-7/4)
Str. loose varying to compact granular.
Tex. sand to small gravel with occasional fragments 2-4" across.
Resting on a smooth, very ~~flat~~ hard flat indurated lime-sand or beach rock (rings when struck with pick and sends showers of sparks).

a few scattered coconuts, and, in southern half, with open Pisonia forest. Profiles 12 + 13 in scrub, 13 in Scaevola, 12 in mixed Messerschmidia, Scaevola, Guettarda.

In coconut plantation scattered clumps and patches of Scaevola brush, masses of young coconuts, scattered Pandanus, ground cover of Triumfetta, Polypodium, Cassytha, Lepturus, very luxuriant, the Triumfetta sending up erect branches

Profile #11 of three layers, totaling 3' to rock.

sample 11-1

Layer 1 0-0.8' whitish pink (7.5YR-8/2), slightly stained with organic matter in upper 0.15'.
Str. loose granular
Tex. coarse sandy.

abrupt change to

sample 11-2

Layer 2. 0.8-1.5' salt + pepper mixture of dark brown (7.5YR-3/2) and pinkish gray (7.5YR-6/2).
Str. loose granular, many coconut roots.
Tex. very sandy loam.
This is certainly a buried A horizon.
transition of 1" to (avg)

Marshall Is., Taka Atoll, Taka I.
100 yards in from lagoon beach near center of island.
~~of~~ Dec. 5, 1951 sparse coconut grove, small grassy opening.

from the prostrate stems, abundantly floriferous, flowers opening late in afternoon. Cassytha forms large dense mats.

Well in this section - water temp. 81° at 10:35 a.m.

Outer third of island uneven mixed scrub, with grassy openings in north part, dense in south part, many fallen trees.

Layer 4

st

Tex.

Sample 13-4

2.5–4.4' very pale brown (10YR – 8/4)
granular, loose,
coarse sand with some gravel, changing to sand and large fragments in bottom 8" or so.

Resting on consolidated fine gravel.

to

at

nuts, and, in southern half, with open Pisonia forest. Profiles 12 + 13 in scrub, 13 in Scaevola 12 in mixed Messerschmidia, Scaevola, Guettarda.

In coconut plantation scattered clumps and patches of Scaevola brush, masses of young coconuts, scattered Pandanus, ground cover of Triumfetta, Polypodium, Cassytha, Lepturus, very luxuriant, the Triumfetta sending up erect branches

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Taka Atoll

Vial #13 – orb weaving spiders from Taka Islet.

Vial #14 – animals from around base of coconut tree in pile of old leaves, etc.

Vial #15 – ants and termites from rotting Messerschmidia log. Larvae in tubes from outside of sheaths of living coconut trees. Other things miscellaneous.

— from the prostrate stems, abundantly floriferous, flowers opening late in afternoon. Cassytha forms large dense mats.

Well in this section – water temp. 81° at 10:35 a.m.

Outer third of island uneven mixed scrub, with grassy openings in north part, dense in south part, many fallen trees.

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Dec. 5 – Taka Islet
Open coconut grove ~~on~~
~~on~~ coral sand soil.

33720 Scaevola frutescens (Mill.) Kr. ✓
5 common under coconuts

5 21 Triumfetta procumbens Forst. ✓
very common, forming
large pure stands
under coconuts.

5 22 Messerschmidia argentea (L.f.) Jtn. ✓
very common in scrub
and under coconut trees.

5 23 Polypodium scolopendria Burm. ✓
abundant everywhere
under coconut trees

5 24 Cassytha filiformis L. ✓
very abundant everywhere
on low growing plants.

5 25 Pandanus tectorius Park. ✓
common under coconuts

5 26 Sida fallax Walp. ✓
occasional to common
under coconuts

5 27 Albugo platensis
common, parasitic on
Boerhaavia diffusa.

3 28 fungus
on dead coconut trunk

---

shrub 2-3 m. tall, forming
rounded masses, leaves
bright green, flowers
dull white, inside of
tube yellowish, edges
of split purple; fruit white.

main stems prostrate,
flowering branches erect,
flowers yellow closed
during middle of day,
open in late afternoon.

shrub 3 m. tall, others
seen taller; leaves frosty
green, flowers white,
fragrant.

rhizome prostrate,
fronds erect.

green to orange; flowers
white; fruit immature.

small tree 6 m tall.

shrub up to 0.3 m. tall,
flowers orange.

causes branches of
host to assume erect habit.

variable in outline.

1951 Marshall Is.

5 23729 Achyranthes velutina H. & A. ✓
common in openings

5 30 Polyporus
on dead Pandanus tree
3 31 fungus
on dead Pandanus tree
5 32 Lepturus repens (Forst.) R. Br. ✓
dominant in many
places in openings, under
trees, and under scrub.
5 33 [illegible]
in edge of coconut grove
on coral sand.

Dec. 6 same.
4 34 Morinda citrifolia L. ✓
occasional in Pisonia
grove, center of island.

2 35 Pisonia grandis R. Br. ✓
occasional all over island,
~~large~~ grove of large
trees in center, with
innumerable root sprouts
2 36 Carica papaya L. ✓
occasional in Pisonia
grove in center of island

5 37 Fimbristylis cymosa R. Br.
only a small colony seen
on s.w. corner of island

Taka Atoll

sprawling herb, up
to 1.5 m. across; flowers
— rose purple.
bright orange-vermillion

erect tufts

black crust on surface of sand.

shrub 3 m. tall; leaves
glossy, dark green,
flowers white, fruit
— ovoid, fleshy.
trees to ~~[illegible]~~ 20 m. tall,
large soft whitish
trunks; all seen
were sterile.

single stemmed
tree, leaves in a
rosette at top, axis
somewhat elongate;
— ♀ flowers white.
small tufts, leaves
stiff.

1951 Marshall Is.

337 38 Suriana maritima L. ✓
2 very rare, few plants on top of s.w. beach

2 39 Terminalia samoensis Rech. ✓
single plant on exposed beach.

5 40 Guettarda speciosa L. ✓
very common in scrub and occasional in coconut grove.

5 41 R Albugo platensis
common, infecting Boerhavia

5 42 Portulaca lutea Sol.
occasional on typhoon-stripped flat facing sea, on bare sand.

5 43 Boerhavia diffusa L.
in sparse coconut grove near north end, on broken coral.

5 44 Fleurya ruderalis Gaud. ✓
abundant in sparse coconut grove, on broken coral (also on sand).

2 45 Morinda citrifolia L. ✓
on broken coral in north end of coconut grove

5 46 Boerhavia
~~sp~~ at edge of scrub at north end of island, exposed situation.

Taka atoll

low shrub 3 dm. tall, all seem sterile.

shrub 1 m. tall, sterile.

small tree 3 m. tall, ~~flo~~ (others taller) flowers white, very fragrant.

produces erect habit in infected branches of normally prostrate host.

fleshy much branched spreading to ascending herb, stems red; flowers yellow, stamens

prostrate, forming extensive mat, from thick vertical root. flowers pink, stamens 2-3.

erect, stem fleshy, bronze; flowers bronze.

shrub 2 m. tall; with seedlings beneath.

prostrate, from thickened roots; flowers pink, 2-4 stamens.

1951 Marshall Is.

33747 Pemphis acidula Forst.
5 beach-rock stripped of loose material by typhoon.

5 48 Boerhavia
in edge of scrub at north end of island.

1 49

on rotting coconut wood

1 50

on rotting wood.

Vial #16 - animals from under loose bark of rotting Pisonia twigs.

Vial #17 - animals from axils of ~~P~~ Pandanus leaves.

Vial 18 - snails from old coniferous log cast up above high tide mark on seaward beach.

Vial 19 - insects, etc. from leaf mold, etc. on ground

Taka atoll

old stubs, left by typhoon, sending out clumps of sprouts. leaves thick, astringent when chewed; petals white; top of fruit maroon.

— prostrate, forming large loose mat; flowers pink. stamens 2-3.

— whitish in color, including ~~and~~ gills.

Tan color with somewhat darker gills.

1951 Marshall Is.

Dec. 7 - same

33751 Digitaria microbachne (Presl) Henr.
x4 small colony on broken coral in north end of coconut grove.

The greater part of Taka Islet is characterized by sandy soil, varying from almost unaltered at the surface to black and filled with humus. The surface is generally covered by scattered small worn coral fragments and occasional cobbles and boulders. The soils are deep and profiles vary, there being usually buried profiles. In the center of the north end of the island, about 100-150 m. in from all three sides is an area, planted to coconuts, of broken coral, the fragments varying locally in size from 2-4 cm. thick to cobbles and even small boulders.

In the Pisonia grove in the center the soil is black, boulders fairly numerous. Here are a

Taka atoll

plants weak, supported by surrounding vegetation.

few plants of Carica papaya.
Many Pisonia trees have been knocked down by the typhoon, and the grove is open, but choked with seedlings and sprouts 1-3 m. tall. The trees are up to perhaps 60 ft. high, now quite scraggly and with leaves badly eaten by larvae.

1951 ~~Mar~~ Marshall Is.

Lujiron

Dec. 7 - Raajerun Island

33752 Lumnitzera?
5

Suriana maritima L. - scattered bushes on sand bar, the one specimen came from growing on exposed beach rock.

Soil sample #14 - A peat forming a tough compact layer 2.5-3" thick. underlain by loose coral gravel with very little sand. Color dark brown. pH 5.5-6.0. In Pisonia grove.

Soil sample #15 - black to dark brown layer, with some foraminifera and coral fragments, 3" thick overlying ~~loose~~ coral gravel. in Pisonia grove. pH 8.0 more crumbly than #14.

Screening sample #16. material scraped from surface under dead leaves in Pisonia grove, on layer from which soil sample #15 was taken, run thru 2 screens, caught on fourth.

Bag sample X - cemented crust on reef flat just above high tide level.

Taka atoll

bush 0.6 m. tall, spreading. much-branched.

On the reef flat on the north side, exposed at medium to low tide, the reef-rock surface is flat with micro-solution features, pointed enough to preclude there being extensive abrasion in process at present. Tiny solution basins stained white in places with precipitated chalk (?) [photo]. On this flat there is horizontal exfoliation taking place, right through corals and other irregular materials, giving smooth flat surfaces, which then start to be pitted again. Several stages of pitting visible ~~in~~ adjacent segments, showing relative times of exfoliation [photo]. The material is a hard, very much consolidated breccia or conglomerate material. (over)

1951 Marshall Is.

Vial #20 insects caught beating Sida fallax

Vial #21 animals collected in leaf mould ~~water~~ in Pisonia grove. Isopods generally common, but great concentration under one coral boulder. Tornatellinids on ~~[illegible]~~ decaying Pisonia twigs. Pupillids loose in soil.

Temp. of very small pools at 9:30 a.m. is 84° F, of dry rock adjacent 85° F.

The inner beach is lined with tall Scaevola scrub with some Messerschmidia. The north passage beach with ~~[illegible]~~ wind-beaten Scaevola scrub with Terminalia Guettarda. The outer beach has an extensive *bare* area, then, on sandy of fine gravel flat a belt of Lepturus-Portulaca with Portulaca more abundant on the outer edge, on extreme outer edge many Portulaca seedlings only, inner part with scattered shrubs

Taka atoll.

of Scaevola and Messerschmidia. Then a belt of low Pisonia scrub (gradually merging around passage beaches into Scaevola scrub of inner beach. This belt giving way to Pisonia grove which occupies center of islet. This is an acre or two in extent. Trees wind-sheared to about 6-8 m., trunks 3-4 dm. or less thick, tops forming a fairly complete canopy, still green but beginning to lose leaves in places. Spacing averages 3-4 m., no undergrowth except occasional Pisonia seedlings or sprouts, except in openings left by fallen trees, which are choked with sprouts. Ground in grove covered by decayed twigs. Soil black, in some places pure tough peat, (sample #14), pH 5.5-6, 5-8 ~~[illegible]~~ cm. thick, in other places with some admixture of pebbles, sand, etc. (sample #15), pH 8, always shallow, underlain by loose coral gravel; cobbles + boulders scattered on surface. Pisonia root systems spreading just under surface, no (p. 85)

1951 Marshall Is.

Lajron

Dec. 7 - Passage bet. Raajenun and Taka Islets.

At low tide there is a current of water a few inches deep flowing into the lagoon. The rock surface is pitted with solution (?) basins a few inches across each with a handful of gravel in it, which has evidently pot-holed the basins to a more or less hemispherical shape. The rims are elevated a fraction of an inch above the surrounding flattish surface.

33753 Dictyosphaeria cavernosa (Forssk.) Børg. (det. Taylor 1955) green.
1 on boulder on reef flat

5 54 Cladophora or Spermothamnion (det. Taylor 1955) yellow felt, binding fine sand.
lining interior of solution basins

2 55 ? Valoniopsis pachynema (Mart.) Børg. (det. Taylor 1955) pale green, very coarse mat.
in depressions in reef

1 56 Microdictyon okamurai Setch. (det. Taylor 1955)
on pebbles and cobbles on reef flat
green, in one plane.

5 57
on reef flat outside of islet
holding fine sand or silt in a putty-like mass, reddish-pink on surface, greenish within.

2 {58
2 {59
rose-pink, thin coating on rocks.

on pebbles or pieces of coral on reef flat in pot-holes.

Taka atoll

from p. 83

pronounced tap roots. A few trees tipped over by typhoon. Openings around edges have Sida and Achyranthes, separately, each forming low scrub, locally, in them, but openings mainly Lepturus.

Temperatures at noon in grove 1 m. alt. 86°F., close to boulders 84.5°F., ground level 83°F.

Terns abundant, esp. fairy terns - nesting.

Noddies + boobies also present.

One bristle-thighed Curlew seen.

33760
3

on ~~Lambis~~ shell on reef

Wotwerok
Dec. 9 - Eluk Islet

Bag sample ~~[illegible]~~ #14/16 contains screenings from surface layers ~~under~~ in Messerschmidia scrub - Pupillidae and perhaps other snails. Also sub-fossil marine echinoids.

Vial ~~21~~ 22 - insects secured sweeping Lepturus repens.

Vial 23 animals secured around roots of Lepturus.

Vial 24 insects secured sweeping Fleurya ruderalis.

Vial 25 animals from under Messerschmidia bark.

Vial 26 Earthworms from under rotting coconut log.

Vial 27 Grasshoppers from grassy openings, common. Geophilids, larvae, etc. from under Pisonia.

red filaments, giving surface a slimy feel.

Jar #3 contains hermit crabs found up between stilt roots of Pandanus and a ~~two~~ skink, from Taka Islet, Taka atoll. a land crab found under a boulder on Raajerun (Lajiren) Islet in Pisonia grove, skink (wrapped in cloth) from same place; hermit crab from Lambis shell on reef between Taka and Lajiren Raajerun Islets, below low tide level; land crab found under rotting coconut log, and gecko found under loose bark of dead Messerschmidia tree, on Eluk (Wotwerok) Islet.

The land crab from Raajerun (Lajiren) ~~was~~ was generally dark purple, the one from Wotwerok Eluk gray-brown, appendages banded with lighter gray.

sparse Messerschmidia
scrub with openings

33761 Boerhavia
6 on broken coral rock in opening in
~~62 Boerhavia~~ also on coral gravel.
~~on broken coral rock~~ in ~~opening in~~

4 62 Boerhavia x?
on broken coral rock in opening
also on coral gravel.

4 63 ~~Boerh~~ Albugo platensis
infecting Boerhavia #33762

5 64 Fleurya ruderalis Gaud. ✓
abundant in openings
especially on broken
rock, but also on gravel,
rarely on logs or
sloping tree trunks.

5 65 Boerhavia
common in opening
and at edges, on broken
coral and coral gravel.

prostrate, leaves thick,
white beneath, stems
scarcely reddish; flowers
pink. Plant infected
with albugo.

prostrate; leaves
thick, ~~stems~~ white
beneath, stems reddish.
~~not much~~ infested
with albugo.

altering habit of
infected branches from
elongate, prostrate,
to erect, short.

erect, stems fleshy,
green, no red color.
(green dominant
color on this islet,
very little trace of
red or bronze seen).

prostrate, stems
reddish; leaves
scarcely thick, white
beneath. flowers pink.
Not infected by albugo.

on seaward reef on
south-west corner of
islet

33766 ~~on~~
1 on clump of Porolithon, down
in crack on outer edge
of reef flat, back of
lithothamnion ridge

1 67 Caulerpa urvilliana Mont.? (det. Taylor 1955)
same.

3 68 Porolithon
on outer reef flat, among
living coral back of litho-
thamnion ridge

3 69 Porolithon
same

3 70 alga
growing on Porolithon

2 71 alga Myxophyceae incl.-? Phormidium (det. Taylor 1955)
forming thin fur on rock
on inner half of reef flat
between tides, holding fine sand

3 ea. 72 Porolithon
73 Porolithon gardineri (Foslie) Foslie f. gardineri
74 Porolithon
75 ~~Porolithon~~ < A Goniolithon sp. / E Porolithon sp.
76 Porolithon making up massive
part of Lithothamnion ridge

1 77 alga
growing on ~~lithoth~~ Porolithon

78 lichen
on bark of Messerschmidia, in sand

---

dark red.

green

rose pink, paler at
tips.

same

pale pink

reddish.

det. Doty

bright rose-pink.

pinkish-white.

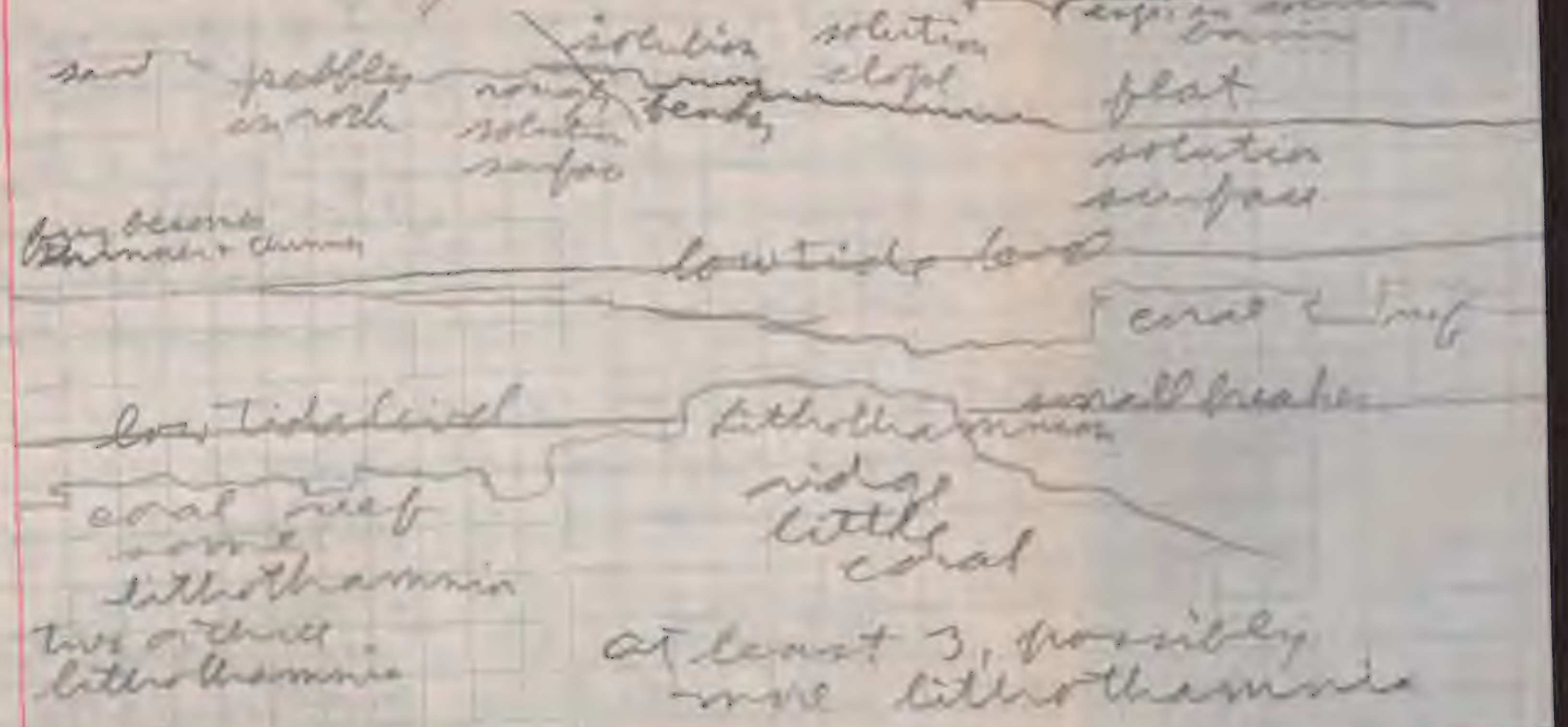
1951 Marshall Is.

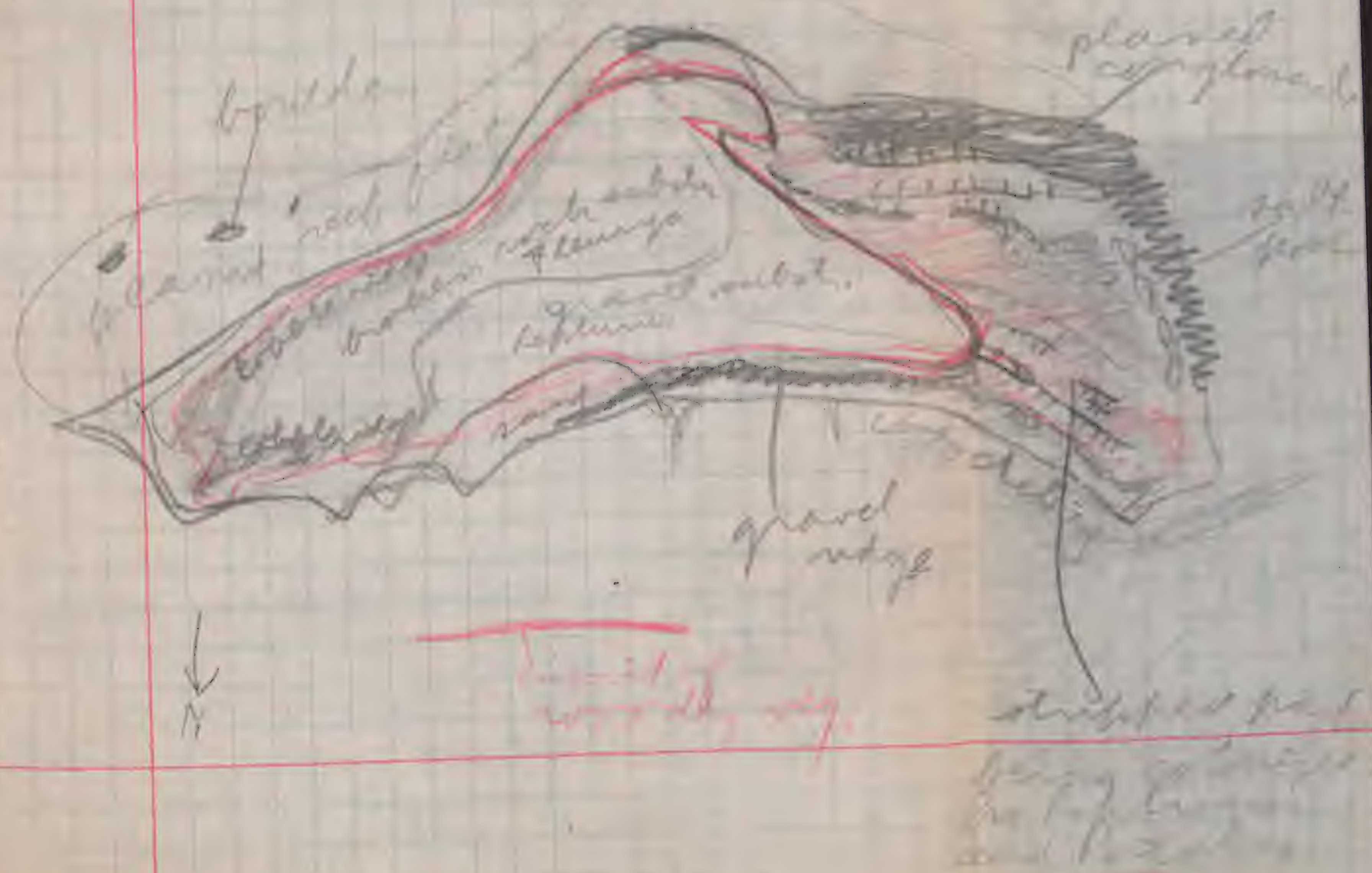
[illegible]
Eluk Islet is about three fourths covered with rather sparse Messerschmidia scrub, with some Scaevola especially along outer beach, scattered low scraggly Pisonias in interior, the scrub in places quite dense and tangled with fallen trees, in places open and with irregular openings. The southwest 1/4 was stripped bare by a typhoon, leaving in most places a thin gravel, with rock exposed in many places (see diagram). This gravel being colonized by Lepturus and Portulaca.

The wooded part of the islet is several feet higher than the denuded part. The southeast part is broken rock surrounded by a low ridge or rampart, the rock varying in size from small pieces 3-5 cm. thick to cobbles, more or less uniform locally, boulders scattered here and there, incl. large slabs of beach-rock far inland.

Eluk Islet — Taka

Outer reef –


sand
pebbles on rock
rough solution surface
solution benches
solution slope
thin algal film collecting sand
edge of solution basin
flat solution surface
[illegible] + Chama
low tide level
coral & reef
small breaker
low tidal level
lithothamnion ridge little coral
coral reef some lithothamnion
two or three lithothamnia
at least 3, possibly more lithothamnia


boulder
reef flat
sand
boulder rampart
broken rock rubble & Lepturus
gravel and rubble
Lepturus
cobble ridge
sand
gravel ridge
planed conglomerate
spilly [illegible]
N
Limit of scraggly veg.
stripped part
being colonized
by Lepturus
and Portulaca

92 1951 Marshall Is.

[illegible]
Eluk Islet is about three fourths covered with rather sparse Messerschmidia scrub, with some Scaevola especially along outer beach, scattered low scraggly Pisonias in interior, the scrub in places quite dense and tangled with fallen trees, in places open and with irregular openings. The southwest [illegible] stripped bare

one not seen in brush.

3 geckos and some eggs seen under ~~[illegible]~~ bark of dead Messerschmidia but ~~not~~ one caught.
Skinks seen but not caught

One housefly and one bluebottle fly seen but not caught.

Otherwise no flies (of these sorts) seen on Taka atoll.

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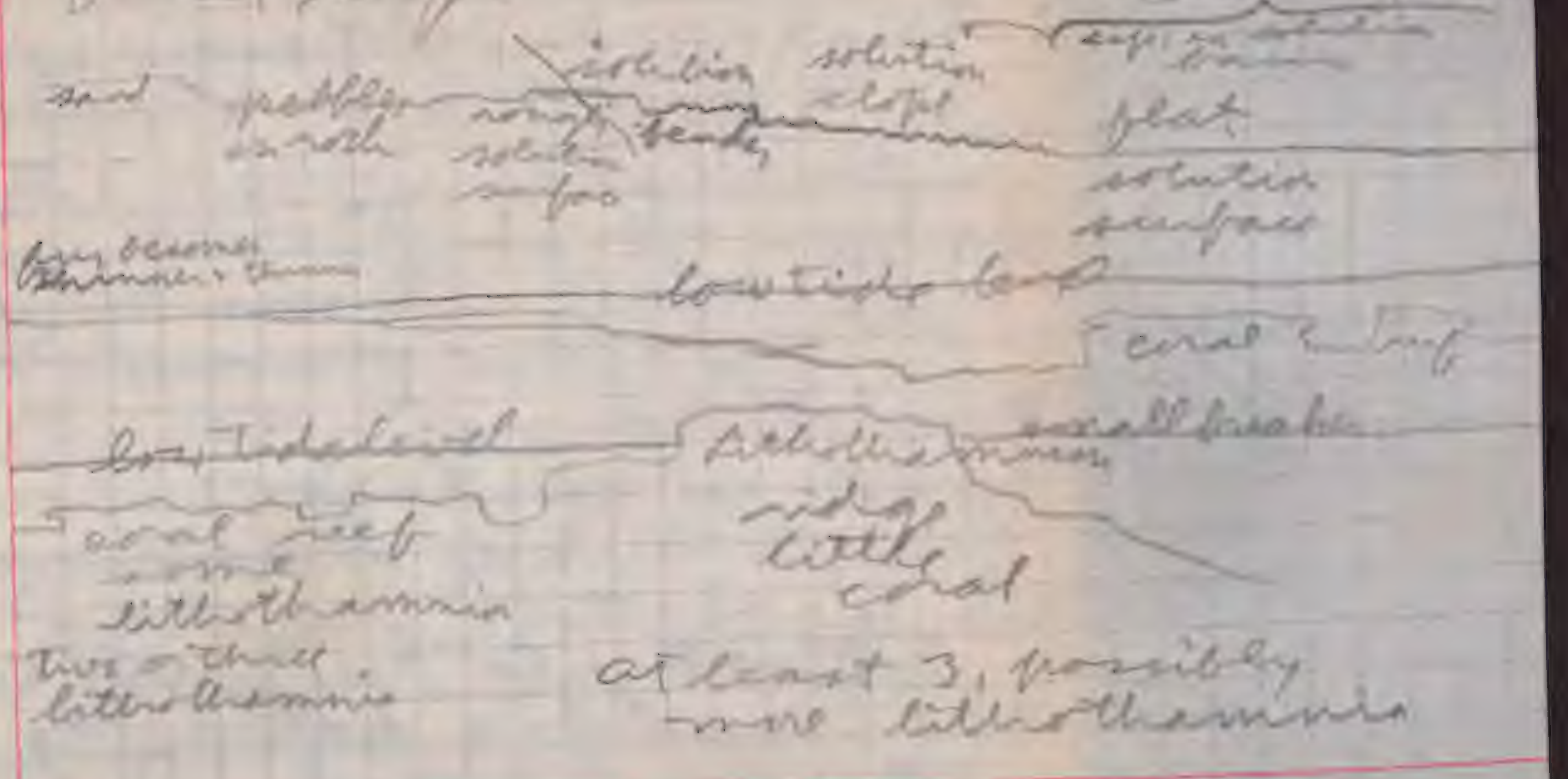
thin A horizon here and there in gravelly part of islet, filled with roots, or under Pisonia, peaty

Eluk Islet — Taka

Outer reef -


this algal fringe encrusting
exp. on solution bench
sand
pebbles on rock
rough solution surface
solution benches
solution slope
flat solution surface
becomes thinner & thinner
low tide level
coral in reef
low tide level
Lithothamnion ridge little coral
small breakers
coral reef some lithothamnia
two or three lithothamnia
at least 3, possibly more lithothamnia

some Boerhavia mats, occasional Portulaca, no Lepturus except very locally in sand spots; much bare broken rock.

The inner beach, opposite the gravel part backed by a low gravel ridge. The lagoon side of island has scrub much damaged by typhoon, with many fallen or broken trees, all pointing southwest, many open places, some in center very sandy; these openings in various

Beach rock almost surrounds
this islet - [illegible] away [illegible] s.e.
corner to an erosion [illegible] exposed
at medium tide, [illegible] there covered
by seaward ridge.
West end (those materials mostly
stripped off. Several lines of
beach-rock both inward and
outward dipping.
Rubble deposit in lagoon opposite
this and extending some distance
eastward.
Eastern passage coast piled
with cobbles, also half way to [illegible] point
along seaward coast, No sand. Also 1/4 way along lagoon beach
3 m. above h.t.
Lagoon beach back of beach rock.
has a low gravel ridge with sand.

swarm
seen midge but ~~not~~ caught.
seen but not caught

ouse fly and one bluebottle
seen but not caught.

wise no flies (of these sorts)
on Taka atoll.

ys here and there in gravelly
st, filled with roots.
Pisonia, peaty.

The Messerschmidia is mostly 2-3 m. tall, with scattered trees to 5 or 6 m. The Pisonia is mostly in the central and eastern part, the Scaevola mostly in the western, sandier part.

The openings in the gravelly part have Lepturus, Portulaca, and Fleurya, the latter forming dense clumps and patches, with Boerhavia mats.

The openings in the rocky part have principally Fleurya stands, some Boerhavia mats, occasional Portulaca, no Lepturus except very locally in sand spots; much bare broken rock.

The inner beach, opposite the gravel part, backed by a low gravel ridge. The lagoon side of island has scrub much damaged by typhoon, with many fallen or broken trees, all pointing southwest; many open places, some in center very sandy; these openings in various stages of colonization by Lepturus and Portulaca, from abundant seedlings to almost closed bunch grass.

Many fallen trees in scrub, mostly fallen ~~[illegible]~~ southwestward.

Total flora (as far as observed)
Messerschmidia argentea
Lepturus repens
Fleurya ruderalis
Scaevola frutescens
Portulaca lutea
Boerhavia diffusa
Boerhavia tetrandra
Albugo platensis
Pisonia grandis
Cocos nucifera (4 plants)
Triumfetta procumbens ~~[illegible] pl.~~)
(one plant on lagoon beach)

Most of day thinly overcast, occasional clouds, gentle trade-wind breeze.
Noon temperatures:
ground level in shade 92°F. & 91°F.
1 m. high in shade 86°F.
1 m. high in sun 88°, 89°F
varies with brightness of sun and changes of strength of wind.
Clouded over at about 4 p.m., breeze freshened, showers in distance.

At 5:15 p.m. temperature
1 m. from ground 82.5°F.
on ground 83.5°F.
during a light shower temp. dropped to 77.5°F., after shower rose to 79°F. dropped to 78.5°, then rose to 81°.
At 7:10 p.m. it was 81°F
At 7 a.m. (Dec. 10) it was 81°F.

This islet is one vast tern rookery, with thousands of sooty terns, many noddies (prob. both species) and great numbers of fairy terns, all nesting.

Gygis alba lays eggs on ~~[illegible]~~ bare branches wherever there is a knot-hole or slight irregularity, scattered generally over island, young in various stages.

Noddies make nests of sticks and leaves, in trees and on ground on open ~~[illegible]~~ pebble flats on east end of island, in trees generally over island. Larger brownish bird mostly seen in trees and on ground, smaller blackish one with

a. stolidus

a. tenuirostris

whiter crown in trees.
Eggs light colored, only lightly speckled.

Sooty terns ~~[illegible]~~ gregarious on seaward side of atoll, ground locally blackened with them, the ground under the seaward row of Messerschmidia bushes scattered with their eggs, laid on gravel or sand with absolutely no nest. Eggs variously colored from grayish to brownish, variously mottled and speckled with brown or dark brown.

When approached these birds rise with deafening clamor by thousands.

Camped on lagoon side - at about 6:30 p.m. a great horde of sooty terns came circling over camp, screaming and squawking, and kept this up continuously till after 7 a.m.

One flock of turnstones on w. end of island on reef flat and rubble bars.

Three Sula leucogaster seen flying over lagoon at 8:30 a.m. (only ones seen at Taka).

Taka - general.

No flies seen here (except, on ~~Eluk~~ Watwaak which may have come with us.)

One mosquito (Aedes sp.?) seen on Taka islet.

No frigate birds, no plovers.

Flora sparse - no Thuarea, no Ipomoea, no weeds, no Euphorbia, no Allophyllus, no Calophyllum, little Suriana.

Vial 66 - material collected by Berlese funnel from leaf-mold from under Pisonia trees, ~~Eluk I.~~ Watwaak I.

1951 Marshall Is.

Dec. 11 anchored in lagoon
11 p.m. wet bulb 28°C. dry 28.5°C.
(this wet bulb figure may be unreliable)

Dec. 12 anchored in lagoon
9 a.m. wet bulb 26°C dry 27.5°C.
sunny with moderate cumulus clouds, moderate trade wind breeze.

Lato

Dec. 12 Lado Islet
4 p.m. wet bulb 27°C. dry 29°C.
sunny. clear blue sky except for clouds around horizon (up to 30°) moderate trade wind breeze.

~~[illegible]~~ 11:50 p.m. almost clear sky, light breeze.
wet bulb 25.3°C, dry 26.5°C.

Seaward and passage beaches lined with dense scrub composed mainly of Scaevola, Terminalia, and Guettarda

Dec. 13 8:15 a.m. almost clear sky, light breeze
wet bulb 25.8C. dry 27°C.
12:05 p.m. slightly more cloudy but still mainly blue sky. breeze slightly stronger
wet bulb 27°C. dry 29°C.

Likiep Atoll

Lato

Dec. 12 - Lado Islet - outer reef. low tide, moonlight.
reef flat almost devoid of life. - several small fish. two spiny lobsters.
Lithothamnion ridge has large pencil-spine sea urchins in somewhat sheltered places.
A spectacular species of Porolithon very common, colonies sphaerical, up to size of human head, of closely packed cylindric branches.

Some Pandanus and Ochrosia. Cordia on passage beach.

3:10 p.m. same
wet bulb 26°C. dry 28°C.

10:05 p.m. sky almost cloudless breeze very slight
wet bulb 25.3°C. dry 26.3°C.

Dec. 12 Likiep Islet
coconut plantation west
of village

33779
5 on ground in path.

5 80
on base of coconut tree

5 81
on wet earth in small taro pit.

Dec. 12 Lado Islet
scrub on passage and
~~[illegible]~~ outer beaches.

5 82 Ochrosia oppositifolia (Lam.) K. Schum. ✓
rare, in interior of scrub.

6 83 Terminalia samoensis Rech. ✓
common on outer edge of scrub

6 84 Cordia subcordata Lam. ✓
occasional along passage beach

1 85 Barringtonia asiatica (L.) Kurz
drift fruit picked up on
outer beach, no trees
seen.

3 86 Cladophora sp. + Polysiphonia (det. Taylor 1955)
abundant in beach drift
at high tide mark

small tree 5-6 m. tall,
milky sap; flowers
white, very fragrant.
— fruit green, old ones under tree.

shrubs 1-2 m. tall; leaves
leathery; flowers fragrant;
fruit immature (fl. + fr. from
— different plants).

large rounded spreading
tree with dense branching
reaching to ground, making
a small thicket of one tree;
flowers orange; fruit dry,
— black, when ripe.

must have drifted a long time,
judging from worn appearance
and growth of bryozoa on surface.

green

1951 Marshall Is.

33787 Polyporus cinnabarinus
1 on dead pandanus trunk
5 88 Suriana maritima L. ✓
one plant in edge of beach scrub
on outer beach

Lato
Dec. 13 – Lado Islet, south end
open coconut grove, with
grassy ground cover.
6 89 Polypodium scolopendria Burm. ✓
common, especially under
trees

5 90 Digitaria microbachne (Presl) Henr. ✓
common, dominant locally
5 91 Eragrostis amabilis (L.) W. & A. ✓
very common locally
10 92 Hedyotis biflora (L.) Lam. ✓
local patches

5 93 Euphorbia chamissonis Boiss.
One large colony seen

5 94 Fleurya ruderalis Gaud. ✓
common, especially on
patches of broken coral rock

Vial #28 ~~Ostracoda~~ copepods? from
salt water at edge of passage
beach at extreme low tide.
(in separate box, ~~for C. Waite~~.)

Likiep atoll

bright vermillion.

much branched
large, bush 2.5 m. tall;
wet with salt spray;
flowers yellow.

rhizome horizontal,
usually buried; fronds
erect, series of intergrades
– from fertile to sterile fronds.
culms weak but ascending.

spreading tufts.

prostrate, somewhat
malodorous when broken;
flowers white, corolla tube
– globose, lobes little spreading
– stems ascending
sap milky; floral
– glands greenish.
– stems fleshy, red.

1951 ~~Likief Atoll~~ Marshall Is.

Lato

Dec. 13 – Lado Islet, south end
Inner third of ~~south~~ hook of islet extremely barren in appearance, sparse Lepturus, Fimbristylis, Triumfetta, etc. only luxuriance seen under Pandanus & Guettarda trees, where seedlings very abundant. Cassytha mats here very sparse and yellow.

sparse coconut grove with some Pandanus + Guettarda.

Soil Profile #17 taken here, also water sample LW-2.

This hole is 175' north of passage beach and 221' east of lagoon beach. At 1:30 p.m. water was struck at 5.5'. The hole was dug perhaps 0.5' deeper, in same material.

The profile has 3 layers.

Layer 1 – 0–0.6', is of fine reddish gray (5YR–5/2) sand under a pebbly surface, with much pebbly coral in it, structure friable fairly compact. texture – fine sand with pebbles ~~Layer 2 0.6–3.0'~~. grass roots and some coconut roots

sample 17-1

Layer 2 – 0.6–3.0' pinkish white to pink (5YR–8/2–8/3), some lenses stained slightly grayish.

structure loose, granular. texture sand of varying fineness, sorted somewhat in lenses, with many water-worn pebbles and cobbles, mostly somewhat flattened, arranged horizontally. Some coconut roots.

sample 17-2

Layer 3 – 3.0–6.0'. white to pink (5YR–8/1, 8/2, 8/3) in a granular mixture.
structure ~~[illegible]~~ very loose.
texture fine gravel with pebbles up to several inches across.

sample 17-3

Water at 5.5' (at 1:30 p.m.)
sample LW-2.
84° F. hydrometer sp. gr. 0.9992 ±1.
milky in appearance, tastes perfectly good.
by 5:30 p.m. water level had risen to 3.9'
by 10:30 p.m. it had disappeared completely.
8:40 next morning 4.7'

Vial #29 – animals from surface of ground in this sparse barren area. incl. 2 sp. ants. several shells that the large ants were carrying.

The center third is a transition to the outer third. ~~The~~

The outer third is also coconut plantation, but not so sparse. Perhaps crown cover 40-50°. Ground cover is mostly complete except in local mound-like areas of broken coral rock (small pieces) with no sand where Fleurya becomes abundant, though mostly quite dwarfed. Otherwise the background is a mixture of Lepturus, Digitaria and Fimbristylis, locally varying in proportions. The soil here is black, less rocky.

There are large colonies of Wedelia and of Euphorbia chamissonis, smaller ones of Eragrostis amabilis, and especially of Polypodium scolopendria. Small patches of Hedyotis biflora very dense.

Vial 30 - insects caught sweeping the grassy ground cover.

Water sample LW-1 is from an abandoned well in this area, with little water but at least 1' of soft muck in bottom, old coconuts, leaves, etc. Strong odor of H_2S.

Sample taken at 8:40 a.m.

79°F. hydrometer sp. gr. 0.9982

Well uncased, at lowest point in general land surface but no depression to speak of.

This type of vegetation makes up almost the entire main body of the islet, with scrub forest belt along entire seaward beach with belt of Wedelia just back of it, this varying greatly in width, apparently due to vicissitudes in clearing it out. Much burning.

Few mounds of broken coral scattered along entire seaward side of islet in coconut groves. Fleurya grows on these. Apparently in such places only does it compete successfully with general ground cover.

Dec. 14 Lado Islet
6:10 p. m. wet 24.7°C dry 26.5°
calm scattered clouds.

Vial 31 - beetles in ripe
head of Pandanus fruit.
(Drosophila seen also but not caught)
Vial 32 - bees - leaf-cutters
entering and leaving
holes in old drift-wood
log on outer beach.
Grasshoppers - common
in grassy ground
cover in cocoanut grove.

In south half of island
are two longitudinal depressions
perhaps 1-1.5 m. below general
level of island. Grass
fairly luxuriant here.
One just back of seaward ridge on s. end.
Soil profile #18 taken here.
Layer 1 - A horizon - 0.-1.3' black
to dark reddish brown or very
dark gray (5YR-2/1-2/2-3/1)
str. loose granular
tex. coarse sand and silt (?)
with much coarse gravel.
grass roots at top; coconut
roots in bottom. Sample 18-1.
gradual transition over
several inches to layer 2.

Layer 2 — 1.3'-2.5' pink (7.5YR-8/4)
str. loose granular
tex. coarse foraminiferal
sand with embedded
coral fragments up
to several inches.
few coconut roots.
~~abrupt~~
abrupt transition to layer 3.

Layer 3 - 2.5-3.9' (+ hole not
dug deeper) water at 3.5'
str. loose.
Tex. fine gravel,
little included coarse
material, practically
no roots.
Water sample LW-2.
tastes very fresh.
Taken at 1:13 p.m. 86°F (had
stood an hour or so after
digging finished)
sp. gr. hydrometer 0.9974
at 87°F.
air temp. 91.5°F in shade.

Dec. 14 - Lado Islet

seaward reef, near south end of islet
Reef flat of solution pitted rock sloping very gradually from foot of seaward dipping beach rock beds.
Rock covered almost everywhere with a felt of algae, rather loose, collecting and holding sand
Outer half of this has circular mushroom-like corals, alive around edges (Porites?), these becoming abundant near outer edge. Whole reef possibly 150-200 m. wide

Reef flat, seaward reef.

33795 Caulerpa urvilliana Mont. (det. Taylor 1955)
5 - fairly common, in full sun

1 96 ~~fairly~~ Cladophora sp. (det. Taylor 1955)
tangled with other fine reds

1 97 Valonia? ocellata? juvenile? (det. Taylor 1955)
tangled with other algae on outer part.

1 98 Udotea indica A. and E.S. Gepp (det. Taylor 1955)
with other small algae
- tangled with Caulerpa

outer 10-15 m. is a ridge, up to 1.5 m. higher than bottom of flat behind it, of several species of coraline algae, mainly of compactly branching head-like types, bright rose-purple color; ridge very irregular, cut by deep surge channels.
Just behind this are jagged remnants of a higher reef surface, up to 1 m. or even more above flat.

green, turning yellowish, creeping, adhering closely to rock bottom.

outer part

green, cells very large.

green, opaque.

1951 Marshall Is. Likiep atoll

33799 Laurencia? perforata (Bory) Mont. (det. Taylor 1955) small pink tufts.
5 common on outermost part of
33800 Microdictyon okamurai Setch. (det. Taylor 1955) flattened, curved, often nest-like; green.
5 occasional on middle part of
5 01 Liagora (det. Taylor 1955)
occasional in outer part of
02 red Centroceras clavulatum (C.Ag.) Mont. (det. Taylor 1955)
and Polysiphonia
common on tufts of Laurencia, Caulerpa, etc. near outer edge of — reddish tufts. (prob. more than one species involved).
5 {03 red algs } Centroceras; Cladophora (det. Taylor 1955)
5 {04 green algs }
forming loose felt on reef flat, holding sand. — possibly not growing mixed but mixed in collecting pail.

on Lithothamnion ridge
1 05 ~~[illegible]~~ Dictyosphaeria sp. (det. Taylor 1955) bluish green.
in interstices of Porolithon
3 06 Dictyosphaeria ? cavernosa juvenile? (det. Taylor 1955) — green, cells large, turgid.
on clumps of ~~P~~ Porolithon
3 07 Laurencia? perforata (Bory) Mont. (det. Taylor 1955) — dark red, terete.
on clumps of Porolithon
3 08 brown algs Pocockiella variegata Lamx Papenf. (det. Taylor 1955) forming yellow-brown skin over Porolithon, closely adherent, like paint.
on clumps of Porolithon

~~A~~ middle part of reef flat
5 09

forming felt on loose cobble collecting sand

1951 Marshall Islands

on Lithothamnion ridge

5/33810 Porolithon craspedium (Foslie) Foslie det. Doty

5 11 Porolithon onkodes (Heyd.) Foslie det. Doty (with goniolithon spp.)

1 12 ~~Porolithon~~ goniolithon frutescens Foslie

5 13 ~~Porolithon~~ goniolithon sp.

1 14 ~~Porolithon~~ goniolithon frutescens Foslie

8 15 Porolithon

($ 33810, 11, 13 from landward side of ridge, 33812, 14, 15 from further out)

Dec. 14 Lado Islet, south end in coconut grove, dry sparse aspect.

~~16 at foot of a~~

2 16 alga?

at foot of old coconut tree, on soil.

5 17 [illegible]

common, forming crust on soil, cracking and curling up in dry weather

moister, more grassy aspect, toward outer beach

5 18 Pandanus tectorius Park.

scattered in coconut grove

5 19 Wedelia biflora (L.) D.C.

large patches, especially along inner edge of scrub belt of seaward ridge.

3 20 Crinum pedunculatum R. Br.

planted and spontaneous around ~~[illegible]~~ dwellings and paths

Likiep atoll

goniolithon sp. 33811 [illegible]

Rose purple color smoother species toward back of ridge

(possibly several forms in this no. yes det. Doty

33815 E, F, I: Porolithon gardineri (Foslie) Foslie f. gardineri

33815 A, D, C, G, J. P. g. f. subhemisphaerica Foslie

33815 B, H Porolithon sp. (with goniolithon spp.)

forming black crust

tree 8 m. tall; fruit ripe, fleshy part orange, very sweet, strong banana flavor. "kemo"

herb up to 1 m. tall, tending to be tangled; aromatic when broken; flowers yellow.

caespitose, up to 1 m. tall; flowers fragrant, maroon without white within, filaments maroon.

inner segments all white.

1951 Marshall Is.

central part of island, grassy ground cover under coconuts.

33821 Premna obtusifolia R.Br.
5 a few trees in central depression

6 22 Vigna marina (Burm. f.) Merr.
large patch near lagoon beach

5 23 Hibiscus tiliaceus L.
single tree near center of island in depression

5 24 moss
on lower side of leaning coconut trunk

5 25 Eleocharis obtusa (Willd.) Schult.
on bare ~~desic~~ desiccating mud of long-abandoned taro pits.

5 26
drying crust on bare muddy bottom of long-abandoned taro pit.

2 27 moss
on side of well depression

2 28 ~~m~~ moss
on vertical side of well

5 29 Euphorbia ~~thymifolia L.~~ ~~thymi~~ prostrata Ait
[illegible] around edge of well near house

5 30 Centella asiatica (L.) Urban
local, nearer lagoon beach

2 31 green alga
in ~~[illegible]~~ well, on gravel and floating (well in use)

Likiep atoll

small bushy trees 5 m. tall aromatic when broken

prostrate; peduncles erect, flowers yellow.

spreading tree 8 m. tall, branches reaching ground; flowers yellow with maroon center.

tufts.

yellow-green before drying.

prostrate; purplish.

prostrate.

33832 Phyllanthus niruri L.
5 common locally around well

– 33 Spirogyra
in water of well

Soil sample #19 – peat, etc. from upper 6" in bottom of old, long-abandoned taro pit. tough, dark brown, root-filled.
Two old coconut trees growing in bottom.
Bottom bare of vegetation except for a few tufts of Eleocharis and an algal skin, desiccating.
Side slopes with Fimbristylis, etc.
Soil beneath peat 5-6", gray.

This from north central part of island. A number of such pits more or less identical.
A few show some recent digging, and these show signs of hog-wallowing.

Vegetation open coconut grove with thick grass ground cover, mainly Digitaria, with scattered Tacca (some tubers seen

erect.

green, very slimy

harvested here), scattered patches of Polypodium, large areas of solid Euphorbia chamissonis, occasional Triumfetta. Pandanus scattered in grove.
Wedelia-Clerodendrum belt along inner side of seaward ridge, inside scrub belt, in places much wider, tangled with young coconuts.
Some areas show results of burning grass – fire apparently originating when piles of coconut rubbish are burned.

Central depression in southern central part has Premna, Hibiscus, breadfruit trees.
Breadfruit and Calophyllum around region of dwellings in south central part, lagoon half.

Dec. 15

4 p.m. almost clear sky
gentle breeze
wet bulb 25.3°C dry 28°C.
6 p.m. almost clear sky,
almost calm. wet bulb 24.8, dry 26.8C.

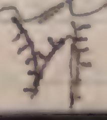
Central part of islet — several water-holes — some mosquito larvae — Vial #33, and many Cyclops from a well with rotting coconuts and leaves in it — Vial #34.

~~#3~~

North end of islet —
A old taro pit just in from passage beach — rather recently cleaned, then apparently abandoned again — coconut seedlings 1 m. tall in it — Eleocharis and Cyperus abundant. Soil sample #20 is muck from here. The soft material is at least

1.5' deep. sample from top 10". pH 8 (3 tests, Truog.)
This depression is much more extensive than the recently cleaned part. The rest is a thicket of Premna and Clerodendrum.

North tip drawn out into a finger like projection, quite narrow. Proximal half very open coconut grove, grass ~~1.5' Deep~~ ground-cover, much Euphorbia. Distal half with broken undergrowth of Scaevola becoming denser toward tip; beach fringe complete on seaward facing side, hooking around perhaps 1/3 the way on the lagoon side, sparser here.

Beach rock dipping outward lines beach on both sides. Near distal end of lagoon side is an outwardly curved ~~arc~~ arc, following for a short distance the inward-projecting sand spit extending from end of point. thus. 

1951 Marshall Is.

Mikiel Islet

Dec. 15 – islet n. of Lado surrounded by Scaevola scrub with some Suriana, etc. Sparse coconut grove, inland, with sparse ground cover of Fimbristylis, much bare ground showing, with algal crust.

5 33834 crust on bare soil

5 35 Fimbristylis cymosa R.Br. dominant in sparse ground-cover.

Seaward part of island prolonged into a long curved neck. The island is only vegetated in the large lagoon-ward portion. The part of this most seaward is only scrub, sparse in the center. The narrow neck is absolutely bare, but here and there with some sand. The bedding of the rock is apparently horizontal.

5 36 very common between tides on solution surface

Long cracks on reef surface, irregularly intersecting,

Likiep atoll

Soil sample #21 brown loose soil, at least 11" deep.

Coconuts with almost no inflorescences, some of them very slender and abnormal, mostly healthy-looking but just not producing nuts.

tufts, leaves stiffish.

Passage between islet and Lado has reef-rock eroded away seaward from lagoon in an irregularly scalloped manner, with an undercut shelf on inner side, mushroom rocks. Surface mostly very deeply pitted, tall rims around solution pits. Part near Lado has some loose detritus and has sharp edges abraded off.

brown; firmly gelatinous.

solution-eroded to V [illegible] cross section. Origin not evident.

(1951) Marshall Is.

Dec. 15 - Lado Islet

33837 Halimeda
2 bottom of lagoon end of south passage
2 38 Halimeda
bottom of lagoon end of south passage
3 39 Tacca leontopetaloides (L.) Ktze ✓
open coconut plantations.
4 40 Artocarpus altilis (Park.) Fosb.
scattered, near dwellings, seedlings numerous under parent tree.
5 41 Thuarea involuta (Forst.) R. & S. ✓
occasional in grass ground cover.
5 42 Euphorbia heterophylla L. ✓
common very locally, near cemetery.
5 43 Catharanthus roseus (L.) Don ✓
local, in cemetery
1 44 ~~Cat~~ Sida fallax Walp. ✓
one plant seen, in coconut grove
5 45 Cyperus odoratus L. ✓
small colony in mucky organic soil in old taro pit.
5 46 Clerodendrum inerme (L.) Gaertn. ✓
thicket in old taro pit, also along inner edge of beach scrub.
5 47 Pemphis acidula Forst. ✓
one tree on extreme west point of island, on sand-covered beach-rock.

Likiep atoll

gray-green, rooted in sand.

— flowers green, ~~&~~ filiform bracts purple.

— tree 8 m. tall, sap milky.

prostrate, mat-forming; flowering branches erect.

erect; bracts partly red.

flowers white.

erect.

tangled sprawling shrub, forming masses up to 3 m. tall; flowers white with maroon stamens & style.

— gnarled old tree, 2 m. tall; leaves astringent; flowers white.

1951 Marshall Is.

33898 Portulaca samoensis v. Poell. ✓
5 common in thin spots in ground cover on gravel soil.

5 49 Premna obtusifolia R.Br.
local around old taro pits and depressions, forming thickets

2 50 Bryophyllum pinnatum
local around ~~[illegible]~~ depression in center of island.

Dec. 16 Likiep Islet

5 51
on surface of wet soil in old taro pit.

2 52 Pisonia grandis R. Br. ✓
a few scattered trees in beach scrub-forest

2 53 Jussiaea
two plants seen in taro pit

2 ✓ 42 [illegible] 54 Paspalum vaginatum Sw. ✓
abundant in and around taro pits

5 55
on dead part of Pisonia tree in beach scrub forest

2 56
on bark of dead part of Pisonia tree in beach scrub forest.

2 57 Canavalia microcarpa (DC.) Piper ✓
in inner edge of beach scrub-forest,

Likiep atoll

prostrate, root tuberous. leaves fleshy, flat; flowers yellow.

small bushy tree 5 m. tall, lemon-scented when broken; flowers green; "kaar".

(Lam.) Kurz — leaves very thick; sterile.

pinkish gray, crumbly-gelatinous.

old scraggly tree, partly dead; sterile.

sterile.

sterile; culms erect or ascending

cream-white in color, darker above.

extensive vine, climbing over trees; flowers magenta.

37858 Russelia equisetiformis Schlecht. & Cham. ✓
3 occasionally cultivated
around houses

2 59 Cyperus javanicus Houtt. ✓
rare around buildings,
lagoon side of island

Dec. 15 Lads Islet.

1 60 Barringtonia asiatica (L.) Kurz ✓
at top of beach
possibly from drift seed.

1 61

on rotting coconut petiole

Vial 35 - insects picked up around camps. Termites but collected on bottom of a wooden box but had made no burrows.

Dec. 16 Likiep Islet

Vial 36 - animals found under bark of dead part of Pisonia tree in beach scrub forest - lower layer. Upper layer - cochineal scales found on Scaevola leaves. ~~Others around~~

plant caespitose,
stems arching -
- procumbent; flowers red.
small tufts.

seedling 0.5 m. tall.

Vial 37 - Orb weaving spiders.

1951 Marshall Is.

[illegible]
Dec. 18 - Islet just inside passage - sand piled up, a few coconuts + other trees.

Aelone
Islet to rt. of passage - sand dune on inner corner next to passage.
Little beach scrub except in outer part of passage beach, some along seaward beach.
[illegible] Islet to left. - Passage beach well lined with Scaevola - Seaward beach has Scaevola fringe + row of Messerschmidia just inside it. Coconuts close to beach.
Low cliff ("?") of rock below seaward beach at mid-tide (?) (9:45 a.m.)

— MacNeil brought pieces of Russelia equisetiformis, Catharanthus roseus + Euphorbia heterophylla from Enijaba I
and reported a mangrove depression, apparently with Bruguiera, on Jeltenet Islet.
[illegible]

Likiep Atoll.

Viewed from sea as ship went by.

→ south end is low scrub for about 1/4 the length of islet, scattered coconuts on distal half.

4 of the 6 small islets between this and Likiep - well wooded, with a few coconuts. The second and fifth only have low scrub.
Aelone

Likiep Islet - Seaward beach with scrub fringe the whole length except for a short stretch near w. end. The 1/3 on the east opposite the village, is low and sparse, seen from the sea.

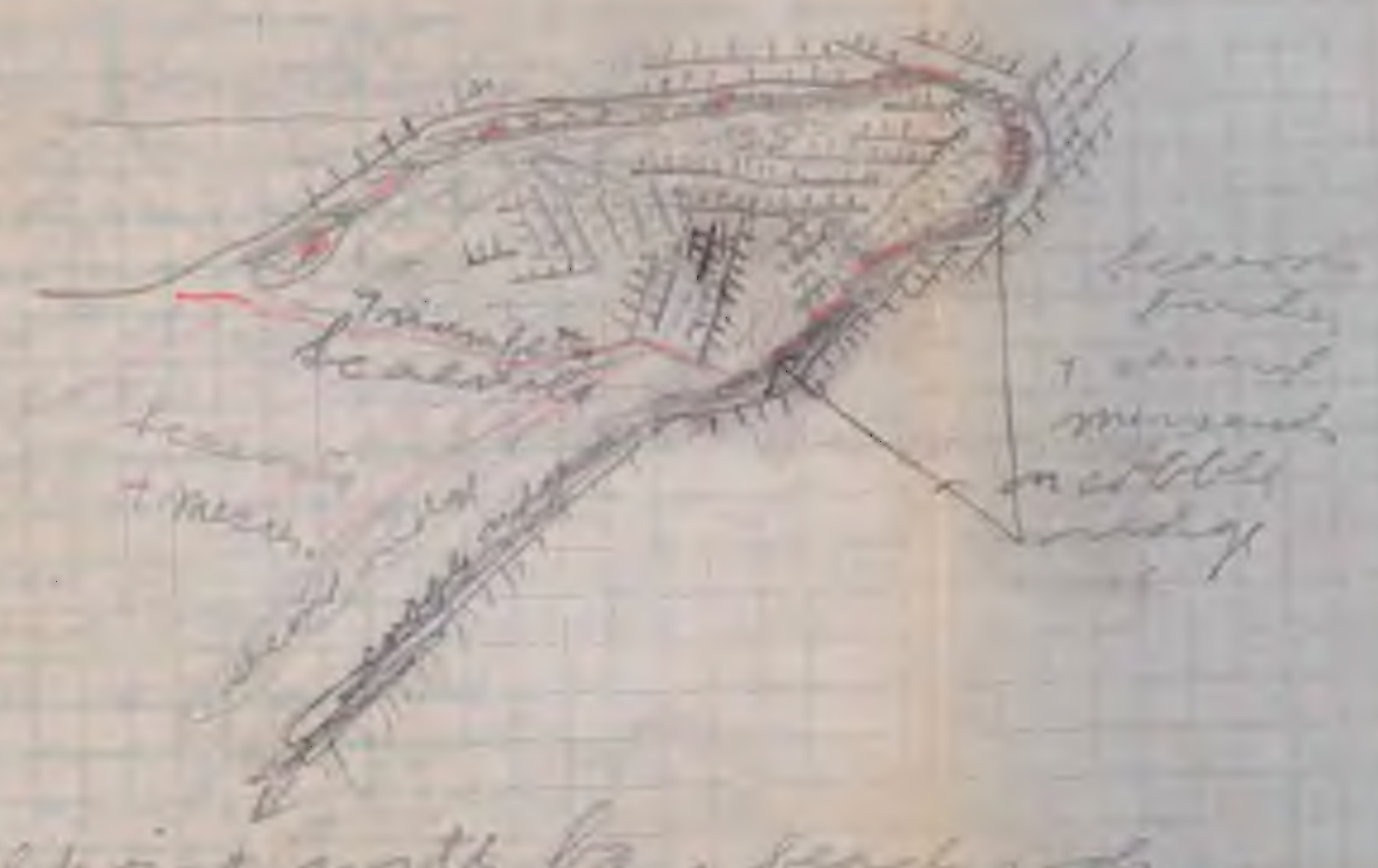
Dec. 16 - Likiep Islet
east passage beach
has areas of shingle
with no vegetation.
Messerschmidia forest
backed by Pandanus
forest between shingle
and coconut plantation

Coconut plantation
in this end of islet
has very rocky soil -
mostly broken coral.
this becomes a shallow
blackish soil further
north, then varies
to broken coral with
sand that has
not much organic
matter. The north
end of the islet has
partly this and
partly blackish soil.

The coconuts are at
a moderate distance
apart. The ground cover
is generally grassy -
Lepturus, Digitaria, and
Fimbristylis, varying
in proportions. one or
other dominant. Locally
but sometimes over large
areas Euphorbia cham-
issonis becomes dominant,
almost pure stands.

Polypodium scolopendria
forms colonies, especially
under trees. Wedelia
forms patches locally,
as does Vigna marina
and Canavalia microcarpa.
Triumfetta procumbens
is occasional, especially
near lagoon. Tacca
is occasional, especially
inland. Cassytha
forms mats here and there.

Pandanus is scattered
in this plantation as



of point south bare beach rock,
very complicated pattern

Dec. 16 - Likiep Islet
east passage beach
has areas of shingle
with no vegetation.
Messerschmidia forest
backed by Pandanus
forest between shingle
and coconut plantation.
Coconut plantation
on this end of islet
has very rocky soil -
mostly broken coral.
this becomes a shallow
blackish soil further

Father John F. McCarthy, S.J.
CAU, NAVY 824, Kwajalein
F.P.O. San Francisco
[illegible]

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is occasional, especially
near lagoon. Tacca
is occasional, especially
inland. Cassytha
forms mats here and there.

Pandanus is scattered
in this plantation, as
are Morinda, Calophyllum,
and Guettarda. Artocarpus
is very common near
and in the village and
around dwellings, but
not directly on the
lagoon beach and not
near the seaward beach.

There are a few old
taro pits, some of which
have been cleaned out
and replanted in recent
years, but which are
mainly choked by
Paspalum vaginatum,
Cyperus odoratus, etc.
Soil very peaty or mucky.

A few plants of Cyrto-
sperma are in some of the
patches, esp. those

belonging to Anton DeBrum, who says that several years ago there was a revival of interest in taro culture, but that it has died down now and all pits have been abandoned but his.

Further west, where the soil is poorer, the ground cover becomes very thin. Portulaca samoensis becomes commoner, as does Thuarea locally, and Eragrostis amabilis. There is one colony of Rhoeo discolor established.

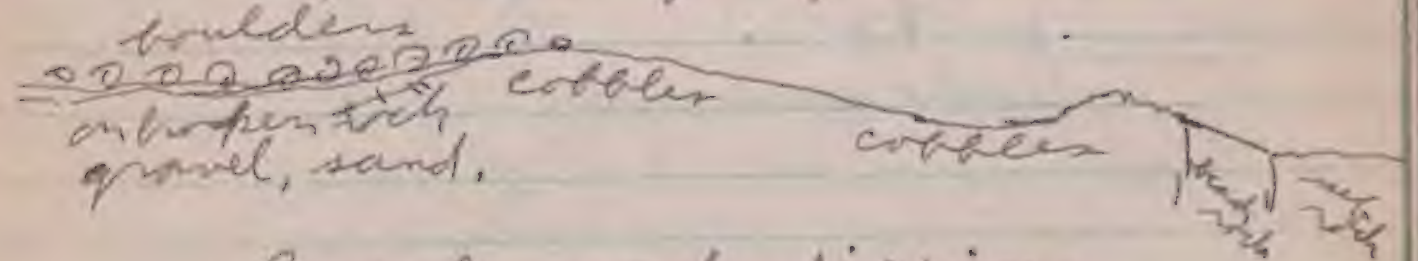
Near east passage, back of village, is a large open grassy space. Here there is better soil, not deep (1 dm.±) but blackish. Used at one time as a baseball diamond.

Along seaward beach directly back of village, for at least ½ the length of this coast (east) there is a sparse mixed scrubby forest belt ~~at least~~ up to 30-40 m. wide. This has grassy

or rocky openings, is of Messerschmidia, Scaevola, Guettarda, festooned by Cassytha. Wedelia forms, in places, a tangled undergrowth. A few scattered scrubby Pisonia trees.

Here the seaward ridge is back 30-40 m. from edge of ocean, sloping to it, but eastward developing a second, lower ridge immediately back of beach; both ridges mainly of cobbles. Get a bit closer together eastward. Coconuts to top of inner ridge. Boulders abundantly scattered in plantation for at least 75 m. in from inner ridge.

General profile:



Beach rock dipping seaward all along this beach. Old and eroded.

About 200-300 m. from end of east point, coconuts cease and vegetation is mixed forest of Guettarda, Messerschmidia, a few Pandanus, a few Pisonia, Scaevola undergrowth, tangled with Wedelia, all on very cobbly soil. This gets lower seaward, and ~~disappears~~ becomes Scaevola scrub, then disappears about 50-75 m. from point, except as Scaevola somewhat follows the cobble ridge around periphery of bare area. This bare part of point is illustrated, with its complicated series of beach rock, in the accompanying drawing. (p. 132-3.)

Weeds seen:

Likiep - general.

Birds seen:
Common noddy.
Fairy terns (occasional)
Golden plover (occasional
(Dec. 15) flock of 4 on reef flat at low tide)
(Dec. 16) Turnstones (several small flocks seen, one of 2-3 birds on Likiep I.)
(Dec. 15) One white reef heron (Lado)
(Dec. 14) One New Zealand Cuckoo (Likiep seaward beach)

Rats (R. exulans?) on both Lado and Likiep I.
Lizards - skink,
gecko (not caught)
big green
large gecko (not seen but reported by Father McCarthy)
large black skink (not seen, reported by Father McCarthy)

Pigs, chickens, dogs, cats, humans seen on Likiep.

Jar #4: Lizards from Lado Islet.
Hermit crabs from Lado.

1951 Marshall Is.

p.46 [illegible] Dec. 18 – at house
2:35 p.m. sky mostly overcast gentle breeze wet bulb 27°C. dry 28°C.
8:45 p.m. bright starry sky. calm. wet bulb 25.5°C. dry 26.5°C.

Flock of 15 Fregatta minor seen (breast white) over islet.
1 Sula sula, ~~[illegible]~~ 1 Sula leucogaster seen near islet.
Common noddy occasional.
Fairy tern occasional.
Birds obviously common, judging from staining of Pisonia leaves and ground by guano.

Vial 38 – scorpion found in house floor, insects caught around light.

Jar #5 – snails found on rocks above high tide level – crab found in same place. Hermit crabs found at top of beach. At least two species of land-crabs, the flat ones not found

Jemo I.

Sand piled quite high on east side. Here there is much fine gray to black pumice, in pebbles from minute to several inches thick (sample #22), several of which (sample #23) are covered partly by a mat of roots – not possible to say what kind.
Two large cobbles of a coarse black scoriaceous pumice, very water-worn also found (sample #24).

In box of Jemo insects – moths that came to light. Also snail shells found at edge of Scaevola fringe at top of beach.

---

far from beach, the thick purple ones found anywhere on island. Lizards, skinks, very common, especially around house, mostly on ground.

1951 Marshall Is.

Undisturbed beach showed 44 turtle tracks, fresh enough to still show footprints, indicating that at least 22 turtles had come up to the top of the beach to lay eggs. ~~Hole~~ Depressions in the ground indicated where eggs had been deposited. (photos of tracks)

Went out at 2 a.m. found only two new tracks, found the turtle that made them heading back toward the sea. turned him over to be photographed in the morning. He was very large and heavy, measured over 30" across and 4' from nose to tip of tail (head withdrawn in).

No new tracks in the morning.

Jemo I.

Dec. 19 -

Vial #40 - larvae with cases were on decaying coconut leaves forming side-wall of porch of house, common. Ants on Phyllanthus niruri plants (same sp. as in Vial 39). Orb-weaving spiders between young coconut seedlings, & Pisonia seedlings, etc.

Dec. 19 - mostly cloudy
frequent showers
sun for short periods
almost calm.
wet bulb 27.5°C. dry 28.3°C.

broken clouds, moderate
breeze
wet bulb 20°C dry 27°C.

Pisonia grove - extends
in a narrow belt along
the west side of the
island on the high
ridge back of the beach.
Trees 60-70' tall, ~~to~~ up
to ~~[illegible]~~" ~~[illegible]~~ 13' circumference
breast high (large branch
below this on one measured);
8-20' apart, canopy
almost complete, no
undergrowth except
~~[illegible]~~ Pisonia root sprouts.
Ground well stained
with guano.
Soil profile #25. (partial profile)
3 layers - 2', not dug deeper.
Layer ~~[illegible]~~ 1 - dark reddish
brown (5YR-3/2 - 2/2) peat 0-0.5'
structure - tough but very

friable when crushed.
texture - very fine peat
but with many roots.
pH 6.5 sample 25-1.
Layer 2 - 0.5-0.8' matrix very
dark gray-brown (10YR-3/2)
grains white (10YR-8/2)
Structure - weakly cemented,
some parts can be crushed
by strong pressure from
fingers.
Texture - cemented
coarse sand, forming
a soft rock. pH 7

sample 25-2

Layer 3 - 0.8-2'+ (hole not
dug deeper). very dark
brown (10YR-2/2) with
tiny white grains.
Structure - loose.
texture - sandy loam
with gravel, becoming
more rubbly downward.
pH 8.

sample 25-3

another partial profile #26
Layer 1 - 0-1' - dark reddish
brown peat (5YR-2/2-3/2)
structure - friable
texture - fine powder
with many roots.
pH 4.5 (3 tests Truog)
Sample 26-1
Underlain by a coarse ~~cement~~.
rubble of fragments of a
cemented material

with a very dark brown
(10YR-2/2) matrix
and white grains.
Sample 26-2
Located not far from #25

The ~~rubbly~~ material
in the second layer of
these samples may
well be cemented by
phosphate. It seems
characteristic in and
immediately around
the Pisonia grove.

At the north end
the Pisonia grove has a
grass ground cover.

Vial 39 - around roots and
in depression ~~at~~ in base of
Pisonia - ants had nest in
this depression about 0.3 m.
above ground. Sting and bite
viciously. Isopods in
same depression and in
litter on forest floor. Pupillids
mostly on ~~[illegible]~~ pieces of
rock that seems to be the
phosphate cemented material
of samples 25-2 + 26-2.
Tornatellinids on dead Pisonia
leaves and twigs in depression
on trunk. Orbis(?) on ground.

Coconut grove - rather
closely planted but
with some sparser
spots.
Ground cover of Lepturus,
Triumfetta, etc

Soil profile #27 (partial profile)
0-3'+ four layers
Layer 1 - black (10YR-2/1)
0-0.7' pH 8 (Truog)
Structure - crumbly.
Texture - fine "silty" ~~[illegible]~~
with some gravel,
grass roots, some
coconut roots. Sample 27-1
Layer 2 - black (10YR-2/1)
with conspicuous white
grains. 0.7-1.1'
Structure - loose rubbly.
Texture - mixture of
"silt" and fragments,
coconut roots.
Sample 27-2.
Layer 3 - salt + pepper
mixture of dark gray
(10YR-4/1) and light brown
gray (10YR-6/2) 1.1-2.4'
Structure - loose.
Texture - loamy sand.
Layer 4 - very pale brown (10YR-8/3)
2.4'-? hole not dug deeper.
Structure loose
Texture - very coarse sand.

1951 Marshall Is.

Coconut grove on ~~[illegible]~~ west side, adjoining Pisonia grove, also where house is situated, has a great many Carica papaya in second story, along with a few Pandanus. Tacca is common; Canavallia local, weeds such as Eragrostis, Cenchrus, Euphorbia prostrata, etc. local. Most of second story (or an intermediate story bet. second and ground cover, is of great numbers of coconut seedlings about 2 m. tall (to tips of leaves). A few trees of several years age, most rather tall. Many nuts on tall ones.

About the house is a veritable weed-patch— Cenchrus abundant, Digitaria also, Euphorbia hirta, Carica, Physalis, Phyllanthus niruri, and various obviously planted species, incl. Artocarpus, Plumeria, Clerodendrum inerme, Pseuderanthemum, agave,

Jemo Island

Many common noddies seen flying overhead. Some fairy terns, one or two boobies, and in evening, several frigate birds.

Vial 41 – ants on Morinda leaves. Larva on Pisonia tree. Spider on beach.
+ Blattid on ground in opening, under Boerhavia.

Vial 42 – insects on small staminate Carica papaya inflorescences.

Curculionidae on Scaevola leaves – these with tissue very seriously eaten away in spots. Coccinellids also on Scaevola leaves. Blue Chrysomelid in fungi under bark of standing dead coconut tree. ~~Moth in ab. [illegible]~~

1951 Marshall Is.

Dec. 19 – in coconut grass around house.

2 33862 Agave sisalana Perr. ✓
a few plants around house

3 63 Triumfetta procumbens Forst.
very common in ground cover.

6

5 64 Lepturus repens (Forst.) R. Br.
very common in ground cover, pure stands ~~[illegible]~~ locally.

2 65 Plumeria rubra L. ✓
planted around house

2 66 Pseuderanthemum carruthersii var. atropurpureum (Bull) Fosb.
planted around house

2 67 Clerodendrum inerme (L.) Gaertn. ✓
planted (?) near house

5 68 Cenchrus echinatus L. ✓
abundant, especially near house

5 69 Phyllanthus niruri L. ✓
abundant, especially near house

6 70 Digitaria microbachne (Presl) Henr. ✓
abundant in ground cover.

2 71 Calophyllum inophyllum L.
planted around house.
(also seen as germinating beach drift).

5 72 Physalis angulata L. ✓
common weed, especially near house.

Jemo Island

sterile rosettes; leaves green, very fleshy.

main stem prostrate, branches ascending; flowers yellow, opening at about 4 p.m.

tangled mats from prostrate rhizomes and erect branches.

small tree, flowers cream white with yellow inside, fragrant.

small tree 4 m. tall. leaves purple beneath, dark green above; sterile.

small thicket; sterile.

ascending to erect.

erect, up to 1 m. tall.

gnarled cut-back small tree; sterile.

extensive sprawling herb. flowers pale yellow, slightly reddish in throat.

1951 Marshall Is.

37873 Euphorbia hirta L. ✓
5 common around house
5 74 Euphorbia prostrata Ait. ✓
very local in sparse places
in ground cover.
6 75 Eragrostis amabilis (L.) W. & A. ✓
occasional patches
in ground cover, especially
in interior.
5 76 Eleusine
occasional clumps in
openings

Dec. 20 - same
✓ KES.
2 77 Tacca leontopetaloides (L.) OK.
common in ~~plantation~~
coconut grove
5 78 Morinda citrifolia L. ✓
common in grove

5 79 Boerhavia
common generally
5 80 Fleurya ruderalis Gaud. ✓
common locally in rocky
areas in center of island.
5 81 Boerhavia
very local in openings.
2 82 Carica papaya L. ✓
. very common on west
side of island in coconut
grove.

~~83~~

Jemo Island

sprawling at base,
— erect at tip.
prostrate, purplish.

spreading tufts.

clumps, almost erect.

acaulescent, leaves
and scapes erect.

shrub 3-4 m. tall; leaves
glossy; flowers white,
— fragrant; fruit white.
— forming large mats;
flowers pink.
erect, stems green,
. fleshy.

prostrate, green;
— flowers pink.
erect single-stemmed
herb with great rosette
of leaves, flowers
cream-white.

1951 Marshall Is.

· Pisonia grove along west side - in opener parts toward south end Lepturus in places forms a ground cover. Small colony of Cordia near beach. In south part Messerschmidia is becomes common, some of trees almost as tall as the Pisonia.

One Pisonia has several booby nests in it and quite an accumulation of guano under it.

Soil profile 28 Taken here.

Layer 1 - 0-0.4' very dark brown (10YR-2/2) pH 5.0 (strong test)
str. tough, friable when worked.
tex. fibrous, root-filled.
Sample 28-1

Layer 2 - 0.4-0.7' color variable light and brown granular, averaging yellowish-brown (10YR-6/4) pH 8
structure - weakly consolidated crumbling under strong pressure from fingers
texture coarse sand, cemented.
sample 28-2

Layer 3 - 0.7-? very dark gray-brown (10YR-3/2) pH 8 with light grains.
Structure - granular

Jemo Island

texture - loamy sand.
sample 28-3

1951 Marshall Is.

33883 Cordia subcordata Lam.
5 small colony ~~in~~ at seaward edge of grove, others seen elsewhere.

6 84 [illegible]
on bark of ~~P~~ Pisonia.

5 85 [illegible]
on bark of Pisonia.

5 86 Messerschmidia argentea (L.f.) Jtn.
at top of beach at edge of Pisonia forest, fairly common in forest, especially toward south end.

Scaevola scrub on south end of island ✓
5 87 Scaevola frutescens (Mill.) Kr.
dominant in –.

Low forest 3-5 m. tall, principally Scaevola, but with occasional much larger Messerschmidia trees. No ground cover. Surface scattered with pebbles + dead leaves
Soil profile 29 –
~~Layer 1~~ ~~Layer #1 – 0-0.5'~~
~~pale brown (10YR-6/3) (average of salt + pepper)~~
~~structure – very loose~~
~~texture – sand sample 29-1~~
~~Layer 2 – very pale brown (10YR-8/3)~~
~~structure – very~~

This area about 1 m. or more

Jemo Island

tree 6 m. tall; dry fruits only.

tree 5 m. tall (others up to 15 m.); ~~fl~~ leaves fleshy; flowers white.

small tree; leaves bright green; flowers and fruit white.

Layer #1 0-0.5' salt + pepper, averaging pale brown (10YR-6/3) becoming lighter downward
structure – very loose
texture – sand, some rocks.
sample 29-1. gradually changing to
Layer #2 0.5-2'+ (rocks become so abundant at 2' as to obstruct digging.)
structure – very loose
texture – sand with pebbles + cobbles.

below level of ~~plantation~~ coconut grove coconut grove, just inside Pisonia grove.

33888 Canavallia microcarpa (D.C.) Piper ✓
5 common locally

Open ground toward east part of island - openings covered by Triumfetta and Boerhavia mats, broken by large Scaevola bushes, some patches of Lepturus.

6 89 Cassytha filiformis L. ✓
rare, forming mats, parasitic on Lepturus

3 90 Ipomoea tuba (Schlecht.) Don ✓
common in openings and on bushes surrounding

This area is of sand, apparently blown over the tops of the east coast dune ridge. Soil profile #30 —
Layer 1 - 0-0.6' fine salt & pepper darker grains very dark gray brown (10YR-3/2), lighter ones pale brown

small areas where phosphate cemented rock forms surface must have been sites of trees with many bird nests before clearing, which have lost the peat layer. (Samples #31, 31 1/2 & 32)

vine climbing over shrubs and spreading over ground; flowers pink with very ~~[illegible]~~ pleasant fragrance.

This area formerly covered by coconuts, as rotting trunks and some standing dead was common. Small clumps of young trees.

stems green; fruit pale green, not quite ripe.

vine trailing on ground; flowers white.

(10YR-6/3)
structure very loose.
texture loamy sand
Sample 30-1 changes gradually to
Layer 2 0.6-1.4' very pale brown (10YR-7/3-8/3). structure very loose.
Sample 30-2 texture - sand, changes ~~at~~

rather abruptly to
Layer 3 1.4–3' (evidently a buried A horizon) very dark gray brown (10YR–3/2) with mixture of variously lighter grains, general effect (10YR – 4/2).
structure compact but very crumbly–granular.
texture loamy coarse sand
texture becoming somewhat coarser, structure looser and color lighter below the top 0.5'. Sample 30–3

Layer 4 – ~~[illegible]~~ 3' – ?
pink (7.5YR – 8/4)
structure very loose
Texture coarse sand with some gravel.
(hole dug no deeper).

Messerschmidia – Scaevola forest on east side – thick forest little or no ground cover – filled with dead or living leafless branches & sticks in opener places some low growth. Terminalia common.

33891 Terminalia samoensis Rech. ✓
✓ common, especially in opener places.

Dec. 20 – ~~[illegible]~~ 10:45 p.m.
broken clouds, moderate breeze, light shower in progress
wet bulb 25.5°C. dry 25.5°C.

Dec. 21 2:45 p.m.
sky mostly cloudy. occasional periods of sunshine. fresh breeze.
wet bulb 27.3°C. dry 28°C.

Vial 43 – animals found in the leaf-mold in mixed forest on sandy soil.

Vial 44 animals found associated with Messerschmidia. Caterpillars eating leaves & flowers, cocoon on bark (obviously same as caterpillars); small ants in complex galleries in dead stub of large tree. Remainder on top surface of fallen living tree, in decaying depression filled with dead leaves. incl. larger ants.
shrub 1 m. tall (others to 3 m.): all seen sterile.

1951 Marshall Is.

Dec. 21 - Mixed forest on north side of island, on dune sand.

33892 fungus
1 on dead Messerschmidia stub.

3 93 Trentepohlia
on Messerschmidia bark, esp. where exposed to spray-laden winds.

6 94 Achyranthes velutina H.&A. ✓
in undergrowth inside beach ridge

5 95 Pisonia grandis R.Br. ✓
common component inside beach ridge

1 96
on dead Messerschmidia twig.

scrub on s. point of island

9 97 Guettarda speciosa L. ✓
very few plants

5 98 Pisonia grandis R.Br. ✓
dominant in forest on ridge back of beach

2 99 Cocos nucifera L. ✓
planted over most of island

Jemo I.

orange-color

spreading herb, up to 0.8 m. tall, several m. across; flowers rose-purple.

tree 10 m. tall, bark cream-white, leaves light green; flowers green.

shrub 2.5 m. tall, flowers white, fragrant; ripe fruit white sweet but with bitter after-taste.

tree 12 m. tall, fruiting cymes dry, mostly detached.

young tree, trunk 2½ m. tall, leaf 17' long, specimen taken from center, concave side of leaflets down.

1951 Marshall Is.

p. 54 Black note Dec. 22 — 12:15 p.m.
Broken clouds, fresh breeze
Wet bulb 28°C., dry 30°C.
6:10 p.m. clear except for uneven
~~Pt~~ high cirro-stratus moderate breeze
wet bulb 25°C. dry 26.2°C.

33900 Pandanus tectorius Park.
near house (probably planted)

01 Artocarpus altilis (Park.) Fosb.
one plant planted near house

02 fungus
on base of dead coconut tree

03 Auricularia
common under and protruding from bark of old standing dead coconut trunks.

Vial 50 - snails, isopods, spider on under side of phosphate(?) rock in coconut plantation (note single different snail - bright orange color)

Vial 45 - orb weaver in forest and scrub generally; moth in orb weaver's web; Lepisma and cricket on Messerschmidia under dead bark. Grasshoppers caught around lights.

Vial 49 - Thysanoptera (?) inside bracts of ♀ Pandanus tectorius inflorescence.

Jemo I.

tree 6 m. tall,

sapling 2.5 m. tall, sterile.

tan-color, friable, no definite form.

dull pinkish purple or mauve, when young and fresh, protruding parts dry; crumpled appearance natural.

Vial 46 - Caterpillar on Phyllanthus niruri (also seen on Scaevola). Small insects on Lepturus. from sweeping.

Vial 47 - on phosphate rock in Pisonia forest - snails, etc. Earwig & beetles on ripe Pandanus fruit in mixed forest

Vial 48 - caterpillar on ground in open under Boerhavia. small beetles, flies on decaying papaya. 2 larger beetles around light.

1951 Marshall Is.

Sample #33. - phosphatic rock, from large pieces exposed on surface in coconut grove, in various stages of weathering - some seemingly very hard.

Sample #34 surface scraping from under dead leaves under ~~large~~ tall Scaevola scrub in open area on east side of island.

Sample #35 - screenings from under Pandanus tree in coconut grove.

Sample #36 - screenings from under Pisonia tree in mixed Pisonia-Messerschmidia forest on east side of island.

33904 alga
3 on base of large Pisonia tree in Pisonia grove, on corky cracked bark

5 05 Pandanus tectorius Park. in mixed forest along north coast.

5 06 Pandanus tectorius var. inner edge of mixed forest, east coast

---

Jemo I.

Sample #37 - drift seeds & fruits from beaches. - Barringtonia asiatica, Mucuna 2 sp.

All soil and rock samples from Jemo were soaked with sea-water on returning to ship.

Vial #52 - orb weaving spiders, both in same web, ~~in~~ between two coconut seedlings. Flies around fallen Pandanus fruit, near house. Not numerous enough to be annoying.

greenish black

tree 6 m. tall, fruit still hanging on trees, but dry; flowers surrounded by green-tipped white bracts.

— tree 8 m. tall, fruit ripe, yellow at base, edible, sweet, fragrant.

1951 Marshall Is.

33907 on ground where water drips from rain barrel

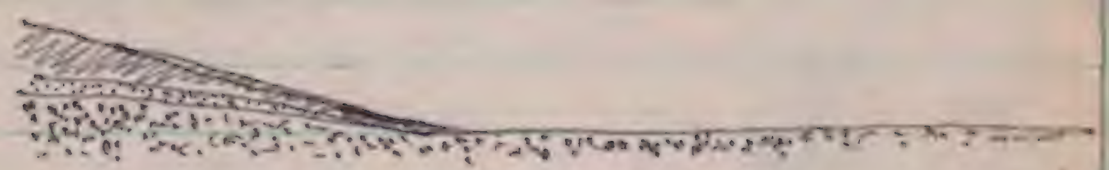
Jemo is egg-shaped, about 3/4 mile long (from Pac. Pilot). The reef flat is narrow, perhaps 50 m. wide, on the west side, wider on the northwest and north, on the ~~south~~ east extending 3 miles or more as a long reef of irregular width, on the south-east about same width as on north west, on south projecting almost the length of ~~the~~ the island as shoal water (observed from color of water, also from ~~an~~ aerial photo.)

~~[illegible]~~ The long reef extending east shows most peculiar cross-channels on the photographs, possibly a reticulate arrangement of surge channels.

During the time of our visit there was a heavy surf all along the north side of this reef, none at all on the east side.

Jemo Island

The island, proper, is almost completely surrounded by a beach-rock or calcareous sandstone, in all places dipping seaward, and where the contact could be seen, resting on, and pinching out on, the reef-rock. One exposure shows a wedge-shaped bed of conglomerate with small water-washed pebbles between the sandstone and the conglomeratic or breccia-like reef-rock. This section was thus:



Only on the south end of the south-east coast does this rock protrude at all above high-tide. Here the cuesta is possibly a foot or two above high-tide, with a trough behind

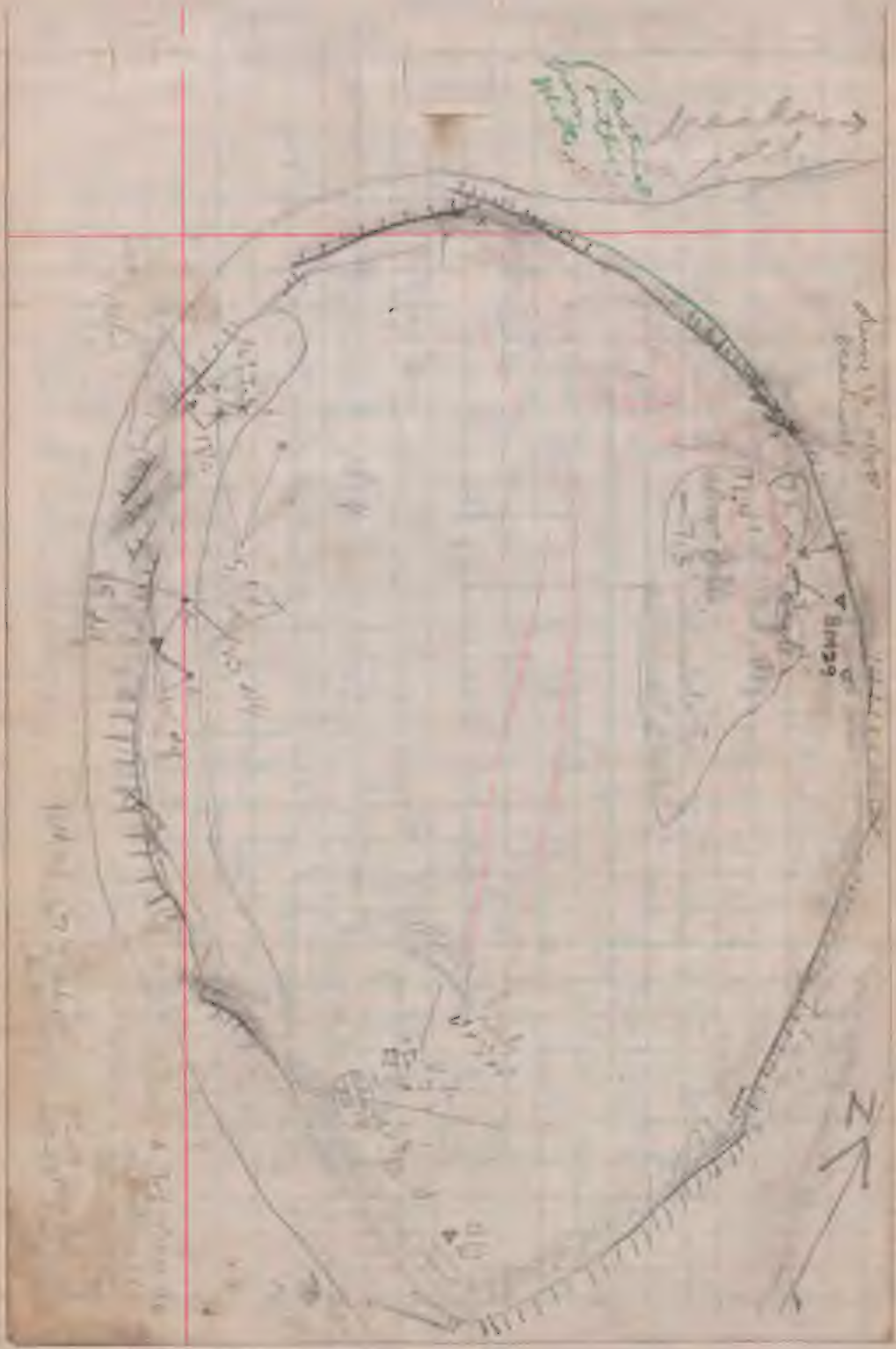
1951 Marshall Is.

it, toward the island.

The weathering of this rock is apparently a combination of solution and abrasion by the load of pebbles and coral fragments that is washed back and forth by the waves. The resulting pattern is a combination of pits that have become small potholes (photo) and channels that have rather rounded bottoms, the sharp edges of normal pitting are in most places worn down by abrasion. Possibly the texture of the rock, a hard fine or coarse ~~sa~~ coral sandstone, may contribute to this effect.

The diagram shows the arrangement of the beach-rock, indicating strikes and dips as nearly as it was possible to determine them with no ~~base or~~ points located on a base map.

Jemo I.



1951 Marshall Is.

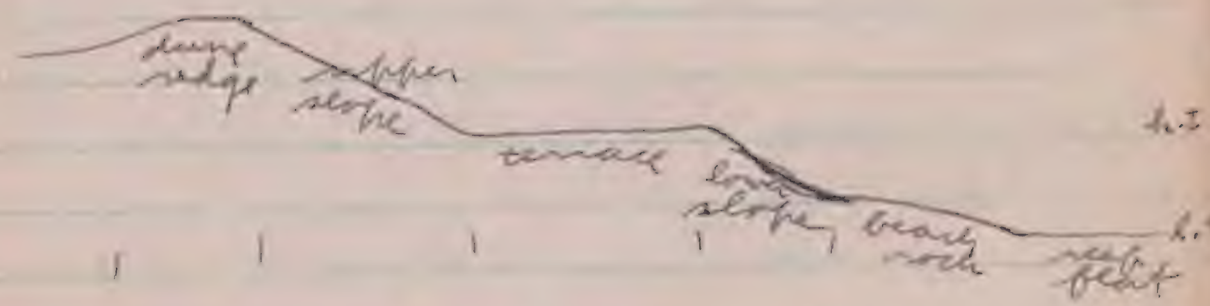
it, toward the ~~[illegible]~~ island.

The weathering of this rock is apparently a combination of solution and abrasion by the load of pebbles and coral fragments that is washed back and forth by the waves. The resulting pattern is a combination of pits that have become small potholes (photos) and channels that have rather rounded bottoms; the sharp edges of normal pitting are in most places worn down by abrasion. Possibly the texture of the rock, a hard fine or coarse ~~[illegible]~~ coral sandstone, may contribute to this effect.

The diagram shows the arrangement of the beach-rock, indicating strike and dips as nearly as it was possible to determine them - with no ~~base~~ ~~[illegible]~~ points located on a base map.

[illegible] mark
[illegible] from bits [illegible]
These [illegible]
[illegible]
[illegible]
and scattered patches of exposed
sloping off inward [illegible] of [illegible]
to a level 7-8' below [illegible] rather abruptly
[illegible] forest
[illegible] and [illegible]
[illegible] toward [illegible]
[illegible] darkened
[illegible] layer [illegible]
[illegible]

The beach around most parts of the island, above the beach-rock, is of fine white sand, with a rather steep slope between beach-rock and high-tide mark: at high tide it usually forms a terrace of varying width, widest on the west side. Above this it slopes up to the dune ridge. Roughly this profile: (with variations in width)



Around the south-east point the slope above the beach-rock is a ~~a~~ cobble-beach extending up to the general level of this end of the island, about 2 m. above high tide. No noticeable ridge here, or only a slight one toward north west end of cobble beach. These cobbles are very much water-worn. ~~Among them~~ On the east beach, slightly north of the middle, is a

light deposit of pebbles and cobbles extending for a short distance on the upper slope of the sand beach. Here were found two cobbles of a black scoria or heavy pumice, very coarse grained but doubtless light enough to ~~float~~ float. Much fine-grained light gray to almost black pumice in the sand here, tiny bits to pebbles the size of a fist.

Around the entire remainder of the island is a low ridge, varying from 4 to 5 m. in elevation above high-tide mark.

On the east and north coasts this ridge is of dune-sand, falling away as much as 7-8 to the flat within. On the west side it is probably fundamentally dune sand, but has been greatly modified (see next p.) On this side it is being very slowly cut away by wind or waves, (see insert p. 173) On the windward side it seems to be building up.

On the ~~south~~ west side this ridge is covered by Pisonia forest 60-75' tall, fronting directly on the beach, of trees of varying size, up to 4' diameter breast high. The canopy in most places is complete, resulting in no ground cover, except where light comes in from the side. Where light can get in at all there is a luxuriant loose mat of Lepturus repens. There are a few Cordia trees at the edges of this forest, and toward the ends Messerschmidia becomes common, in places as much as 60' tall and 2.5' in diameter. These Pisonia trees are the nesting sites of numerous Sula sula (~~[illegible]~~ red-footed booby), also roosting places, at least, for Fregatta minor, noddies, and fairy terns. The surface of the ground is in many places much stained by white guano. It is composed of a layer, several inches thick of peat with a weakly to strongly acid reaction (pH 6.5 - 4.5).

this is underlain by a cemented layer of coarse sand or fine rubble, the matrix being dark brown, probably phosphate leached from the guano. This is underlain by dark gray or black sandy loam. The phosphatic and loam layers are pH 8. This belt of forest is 30-40 m. wide.

Inward from this, to the center of the island, is coconut plantation, very healthy and luxuriant, with black coarse soil a discontinuous layer of this same phosphatic rock just below ~~[illegible]~~ or on the surface, in places concentrated on the surface in low mound-like accumulations. This area probably marks the former extent of the Pisonia forest.

This coconut grove has a ground cover of Lepturus, thin in rocky places (see above), in these Fleurya is common, also Boerhavia, mats of which occur here and there. Locally Triumfetta procumbens dominates, also fair sized areas of

Digitaria microbachne, smaller patches of Cenchrus echinatus (especially near house) and Physalis angulatus. There is a ~~[illegible]~~ second story of seedling coconuts about 1-2 m. tall, in places very dense: apparently no copra has been made here recently. A discontinuous third story 3-5 m. tall is made up of ~~[illegible]~~ Carica papaya, with some Morinda citrifolia and occasional Pandanus. Large patches of this undergrowth are tangled with Canavalia microcarpa, forming a loose mat on the ground and covering shrubs and low trees.

Around the house, which is in a tiny clearing in this grove, is a collection of weeds, mostly (but not all) attenuating in all ~~[illegible]~~ directions from the house. Euphorbia hirta, Cenchrus echinatus, Phyllanthus niruri (gigantic in [illegible]), and Physalis angulatus are very common. Eragrostis amabilis is here but becomes commoner ~~toward~~ away from the house, in the

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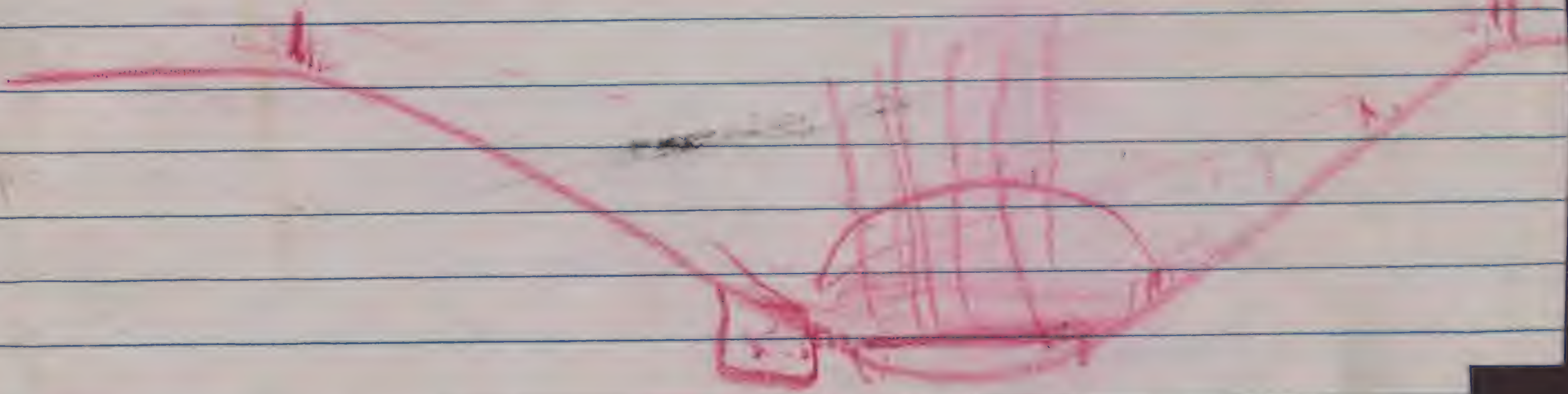
Jeltonet

Eagrostis amabilis

2/3 way up e side

many are in depression.



Digitaria microbachne. smaller patches of Cenchrus echinatus (especially near house) and Physalis angulatus. There is a ~~[illegible]~~ second story of seedling coconuts about 1-2 m. tall, in places very dense; apparently no copra has been made here recently. A discontinuous third story 3-5 m. tall is made up of ~~[illegible]~~ Carica papaya, with some Morinda citrifolia and occasional Pandanus. Large patches of this undergrowth are tangled with Canavalia microcarpa, forming a loose mat on the ground and covering shrubs and low trees.

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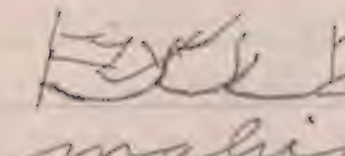
coconut grove, while Euphorbia prostrata and Eleusine indica (a gigantic form, reaching 4' or more tall) are only found occasionally away from the house in the interior. Tacca is common to occasional generally. Around the house Plumeria rubra, Pseuderanthemum atropurpureum, Agave sisalana, Artocarpus altilis (one sapling), and Clerodendrum inerme are planted.

To the eastward the coconut grove seems to be in much less healthy condition. East of the middle of the island the majority of mature coconut trees are dead, the trunks mostly still standing. Young trees with trunks 3-6 or 10' tall are locally common, often a ring of them ~~[illegible]~~ surrounding a standing dead trunk or marking a fallen one. The ground is mostly covered by a thick mat, knee deep, of

Triumfetta procumbens or, locally, Boerhavia. This area is much more extensive than the almost bare area showing on the 1944-45 photos. Scaevola frutescens is coming in very vigorously, and locally, especially in the region bare in 1944, there are large, spreading, low-dome-shaped clumps of Messerschmidia. Mats of Boerhavia are occasional and one of Cassytha was seen (mostly parasitic on Lepturus. A very definite succession seems to be taking place here. When the old coconuts die, Lepturus is left as a ground cover. It is rapidly crowded out by Triumfetta which becomes dominant and much more luxuriant than I have seen it elsewhere. Locally mats of Boerhavia manage to hold their own. Scaevola frutescens is rapidly invading and spreading, forming a scrub of confluent mound-shaped plants, up to 3 m. ~~a~~ more high. The branching is of a horizontal terminalioid type with long upright

or ascending branches —

, the branches making a dense tangle and the rosettes of leaves forming a complete canopy surface. The Triumfetta rapidly thins out, dies and disappears completely, leaving no ground cover at all. Obviously the young coconuts will soon assume general dominance over most of this area. Some of it, especially where bare spots existed in '44-45, has no coconuts as yet.

The soil in this half of the island is pure fine sand with some humus. It probably blows inward continuously from the windward beach. There are some rather prominent mounds in the open parts toward the east.

The dune ridge to the north of the Pisonia grove, and on around the east side of the island, is covered by a mixed forest of Messerschmidia and Pisonia, the former alone on the outer edges, the latter becoming important inward, and down off the dune ridge for some meters inward on the flat. Where this forest is tall it is open beneath and where really dense it lacks ground cover and undergrowth. Toward the beach side it becomes tangled with low Messerschmidia branches and plants. Terminalia samoensis, ~~and~~ Achyranthes splendens, and Scaevola occur here. On the inner edge of the belt, on the western half, there is a dense belt of young coconut trees, at present 3-4 m. tall, to top of leaves. Eastward this is replaced by dense Scaevola scrub with some Messerschmidia.

Toward the south Scaevola becomes most important in the mixed forest, the belt becomes wider and of lower stature. The area within the curve of the cobble-beach ~~, it~~ ~~flat~~ is covered entirely by a mixed scrub, principally

Scaevola, but with many Messerschmidia and few Guettarda plants. The Messerschmidia extend above the level of the scrub. The edge of this tapers off to the top of the cobble beach, where there is some bare sand with Lepturus and Triumfetta. The outer edges of the mixed forest on the dune ridge, also have Triumfetta and an irregular turf of Lepturus in open places.

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Insert p. 171 This is shown by large trees standing up on stilt like roots, with small ones growing on the beach flat between them, some of the large ones in tipped outward positions, and by protruding and undercut beds of phosphate rock.

=

In the scrub on the south end, cobbles and boulders are abundant ~~on~~, becoming less so inward. On the southwest the inner edge of this scrub is marked by a rounded change in level of about 7-8' upward to the coconut grove, the trend being slightly north of east. This seems to disappear inland. Along it, on the coconut grove side, 75 m. or more from the beach, are boulders, including a couple of slabs of beach-rock fully 18 sq.' in area and a foot or so thick.

Salt spray was observed to be blowing inward in noticeable amounts from the windward (east) side. Chlorosis was only noted in weeds such as Euphorbia hirta, Phyllanthus niruri, and Carica papaya, and this only around the house in the open clearing, and to a slight extent generally in Physalis, also slightly in Clerodendrum.

Some chickens exist on the island, their scratching being quite evident. They are not many. No rats or evidence of rats, were seen. Skinks are common, especially around the house, but no other lizards were seen. Birds noted were

Red footed booby - nesting in numbers
Brown booby - one seen flying for certain.
Frigate birds (Fregatta minor) - at least 15 seen flying at once.
Fairy tern - quite common.
Common noddy - quite common
White crowned noddy - several seen but identity not absolutely certain.
Golden plover - one seen positively, one doubtfully (at a different time, may have been same one)
What looked like two owl pellets were being chewed on by hermit crabs.

Turtles apparently visit the island at low tide when the moon is practically full. Tracks of at least 23 individuals were found, comparatively fresh, leading directly up across the beach to the edge of the vegetation, usually ending in a hole several feet across, either at the edge of or inside the vegetation, scooped in the sand.

The one turtle found was caught at 2 a.m., tide very low, moon bright. It was a powerful animal, dragging itself across the rough rocks quite rapidly, heading back toward the sea. When turned over it struggled for a little, then calmed down, emitting a sighing "ahh" sound and tears running from its eyes (my companion's observation). Next morning it was lying quietly but struggled violently when disturbed. After being photographed, it was

released and lost little time in reaching deep water. It was mottled dark olive drab above, yellowish below. Its mouth was a hard triangular beak with sharp jagged edges. It did not attempt at any time to bite. Its front flippers were long and broadly sword shaped, the hind ones short and broadly spatulate; tail short, triangular.

Digging for eggs in a number of fresh holes was completely unsuccessful. Always undisturbed roots were found a little below the bottom of the hole. The eggs were finally found, in a small hole, about 2' deep and a foot or less in diameter, under the broad pile of sand thrown out of the large hole. There were 106 of them, closely packed. They were round, white, about the size of golf balls, with smooth dull surface, a translucent spot on one side where the yolk rested. The shells were only slightly calcified denting on contact with other eggs a with fingers. The whites were completely non-viscous and did not coagulate on cooking. The yolks were yellow and soft. When cooked scrambled they resembled a cheese omelette or an over-cooked welsh rabbit in both taste and consistency.

The ground and the Lepturus turf at the edges of the forest were considerably disturbed by the holes dug by the turtles.

Other than birds, crabs are the most evident animals. The burrows of the common purple land crab are found all over the island. The crabs are seldom seen during the day. Burrows of the broad flat gray or olive shore crab are common above high tide

mark and in the edges of the forest. The common colored shore crab forages above high tide mark. Two species of hermit crabs are very common inland. The whitish one with purple bands across its legs is commonest. It seems to forage principally on the ground, and a group of them will be found around anything even possibly edible. The larger red species, usually inhabiting Turbo shells, while sharing the habits and diet of its neighbor, also climbs shrubs at least to a height of 2 m. It was often seen in bushes but it was not evident what it was after. A favorite food for both kinds seems to be Pandanus fruits, the pulp of which is eaten soon after the fruit falls.

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Insects are quite evident, but not very abundant. The common atoll butterfly (Hypolimnas bolinae?) is common, in two color phases. The speckled day-flying moth [illegible] is very common in openings. Smaller moths are commonly scared up when walking through openings, also attracted to light. Three large flies are common around the house, including the common housefly. At least one species of Drosophila is found around overripe papayas and Pandanus fruits. Small beetles (Nitidulidae?) are found also here. They range from tiny light brown to larger brown and much larger black individuals.

A fair-sized weevil is found on Scaevola, eating holes in the leaves, also (or a similar one) on the male flowers of Carica.

A green lepidopterous larva eats Pisonia leaves,

Jemo I.

in places giving the trees a ragged appearance. Another, resembling a cut-worm, is found here and there on several plants. Still another, a hairy black one, eats leaves and flowers of Messerschmidia.

At least 4 species of ants are common — a large black stinging one with great mandibles, living in cavities around bases of Pisonia trees, foraging generally; the "crazy ant" living in burrows in the ground; a tiny brown one in galleries in dead stubs of Messerschmidia; and a small blackish sluggish one found under stones, logs, etc. in burrows.

At least two Hemiptera and ~~are~~ two leaf hoppers are common on Lepturus.

An elaterid was found, but not caught, in a hollow dead twig. Another commonly came to lights.

Two coccinellids were

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occasional on Scaevola leaves.

A lepidopterous(?) larva which builds cylindrical paper-like cases up to 7-8 mm long is very common on dead coconut leaves, bark of trees, etc.

A thrips in [illegible] pandanus inflorescence.

A very active earthworm is occasionally found in humus, even on top of logs, also seen in soil ~~[illegible]~~ in coconut plantation.

Orb-weaving spiders of perhaps two species are very common, spinning webs between bushes, coconut seedlings, etc. How they all get enough to eat is hard to see. Several other spiders inhabit crannies in the ground or rocks, including a couple of species of hunting spiders.

At least 5, possibly 6, species of true land snails are ~~common~~ found in the humus layer at the soil surface. The pupillid is found in number on rocks in Pisonia forest and mixed forest. The tornatellinid on decaying twigs, etc. The

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Jemo I.

elongate yellowish one in humus and on rocks. The spirally striate one in humus. The elongate orange one, one individual only, found, under a stone.

Two species of operculate littoral snails are found on rocks, logs, etc. above high tide.

At least two mites and one milliped found in humus.

Humus-inhabiting isopods very abundant.

The weather was variable during the visit, from clear and almost cloudless to completely cloudy and rainy, sometimes scattered showers, wind from gentle to stiff breeze, temperature from 25.5° to 30° C.

Ecological processes seen or inferred on Jemo Island.

A Basic, pre-colonization processes (but continuing after colonization).

1 Rise in sea-level after glacial period, possibly drowning all land life, permitting reef surface to reach a high uniform level during post-glacial xerothermic period.

2. Possible emergence of land by bar-formation.

3 Fall of sea-level after post-glacial xerothermic period.

4 Climate becomes more humid after post-glacial xerothermic period.

5 Emergence of ~~land~~ reef surface resulting from fall in sea level.

(1-5) Completely inferred from knowledge gained elsewhere.

6 Building, destruction, and change of land surfaces by typhoons, storm waves, tsunamis, etc. (Inferred from evidence seen on this

and other atolls).

7 Cementation of "beach-rock" and "reef-rock". (Process, time, situation unknown; process inferred only from existence of these rocks).

8 Addition of $CaCO_3$ from various marine sources as sand blown up from beaches, gravel, pebbles, cobbles, boulders thrown up by storm waves. (Sand blowing seen, rest inferred from presence of material in places of deposition).

9 Accumulation of body of brackish or fresh ground water resulting from excess of rain accumulation over diffusion and mixing processes. (Inferred from existence on other islands and from existence of moist soil here).

10 ~~Diff~~ Salt accretion from spray blown inland.

11 Diffusion inward of salt water from periphery and

from below, aided by tidal mixing action. (inferred).

12 Washing outward and downward of salt by rain water.

13 Solution of small amounts of $CaCO_3$ by rain-water. (inferred)

14 Removal of dissolved $CaCO_3$ by diffusion and tidal action. (inferred)

15 Fluctuation of salinity with wet and dry seasons. (inferred).

16 Desiccation by evaporation, accelerated by sun's heat and by wind.

B Colonization processes. (mostly inferred)

17 Visits by sea-birds and shore birds.

18 Colonization by crabs from free-swimming pelagic larvae.

possibly Lepturus ~~[illegible]~~

19 Boerhavia, ~~[illegible]~~, and possibly Triumfetta brought by birds, established as

pioneer plant species.

20 Scaevola, Messerschmidia, Terminalia, Cordia, Ipomoea tuba, Pandanus, and Guettarda seeds arrive in ocean drift, become established as pioneer species.

21 Spores of blue-green algae, possibly seeds of Lepturus, arrive by wind, become established as pioneer species.

22 Introduction, principally by wind, of insects, land snails, ~~ot~~ land arthropods of various sorts.

23 Introduction, by wind, of soil bacteria and soil fungi.

24 Limitation of establishment of species by salinity.

25 Limitation of establishment of species by lack of proper habitats.

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26 Introduction and establishment of non-pioneer species as more mesophytic habitats develop.

27 Introduction of parasitic and predaceous species, as well as saprophytic and saprophagous species after establishment of proper hosts, prey, & sources of organic matter.

28 Production of more mesophytic habitats by action of plants established.

C Successional processes. (inferred from observation of stages in processes) (all processes in B also properly belong here)

29 Destruction of vegetation by storms, etc. (inferred)

Successions observed:

30 Lepturus and Triumfetta on beach to Messerschmidia forest to mixed Messerschmidia ~~t~~and Pisonia, to Pisonia.

31 Lepturus and Triumfetta on beach to Scaevola scrub or Scaevola-Messerschmidia scrub

Jemo I.

to low forest of same, possibly to mixed forest.

D Normal continuing processes. (here belong also #2, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, some of these, as 8, 13, 16, 22, ~~24~~, 26, 27 may be accelerated as total process progresses, some, as 6, 19, 20, 24, 25, may be decelerated.)

32 Carbon cycle.

33 Nitrogen cycle.

34 Production of root, leaf, trunk and twig organic matter by plants.

35 Breaking down of this organic matter into humus by bacteria, fungi, insects, crabs, isopoda, snails and other plant eating organisms, both those that eat living and dead plant tissues.

36 Production of animal organic matter by all animals (p 157)

Index to bag samples.
+ soil profiles

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26	143-4		
27	145		
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29	154-5		
30	156-7		
31	157		
32	157		

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present.

37 Predation of soil fauna by crabs, spiders, etc.

38 Predation of insects by lizards, spiders, crabs(?) etc.

39 Deposition of excrement by purely land-dwelling animals.

40 Addition of phosphatic and nitrogenous matter brought from sea by birds in form of guano, feathers, bodies, etc.

41 Leaching out of these same materials by rain water. (inferred).

42 Cementation of calcareous material by phosphatic cement in forests used as rookeries and roosting places by sea-birds.

43 Catching of sand blown from beaches, by vegetation, resulting in formation of dune ridges around periphery of island. (p. 199)

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29	104		
30	106		
31	108		
32	108		
33	120		

44 Slow undercutting of west peripheral ridge, apparently by storm waves.

45 Mixing of humus and other layers of soil by burrowing of crabs and digging of turtles

46 Enrichment of soil by floating pumice.

E Processes following and dependent upon human activity. (Other processes, of course, continue).

47 Reduction of numbers of turtles by hunting. (hearsay)

48 Reduction of numbers of birds by disturbance ~~and~~ hunting, and egg-hunting. (inferred.)

49 Replacement of greater part of vegetation by coconut plantation.

50 Removal of phosphatic, nitrogenous and carbonaceous material in copra. (inferred but quite certain).

51 ~~Death of~~ Introduction of weeds and cultivated plants, and establishment of some of them.

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4 137
5 138-9.

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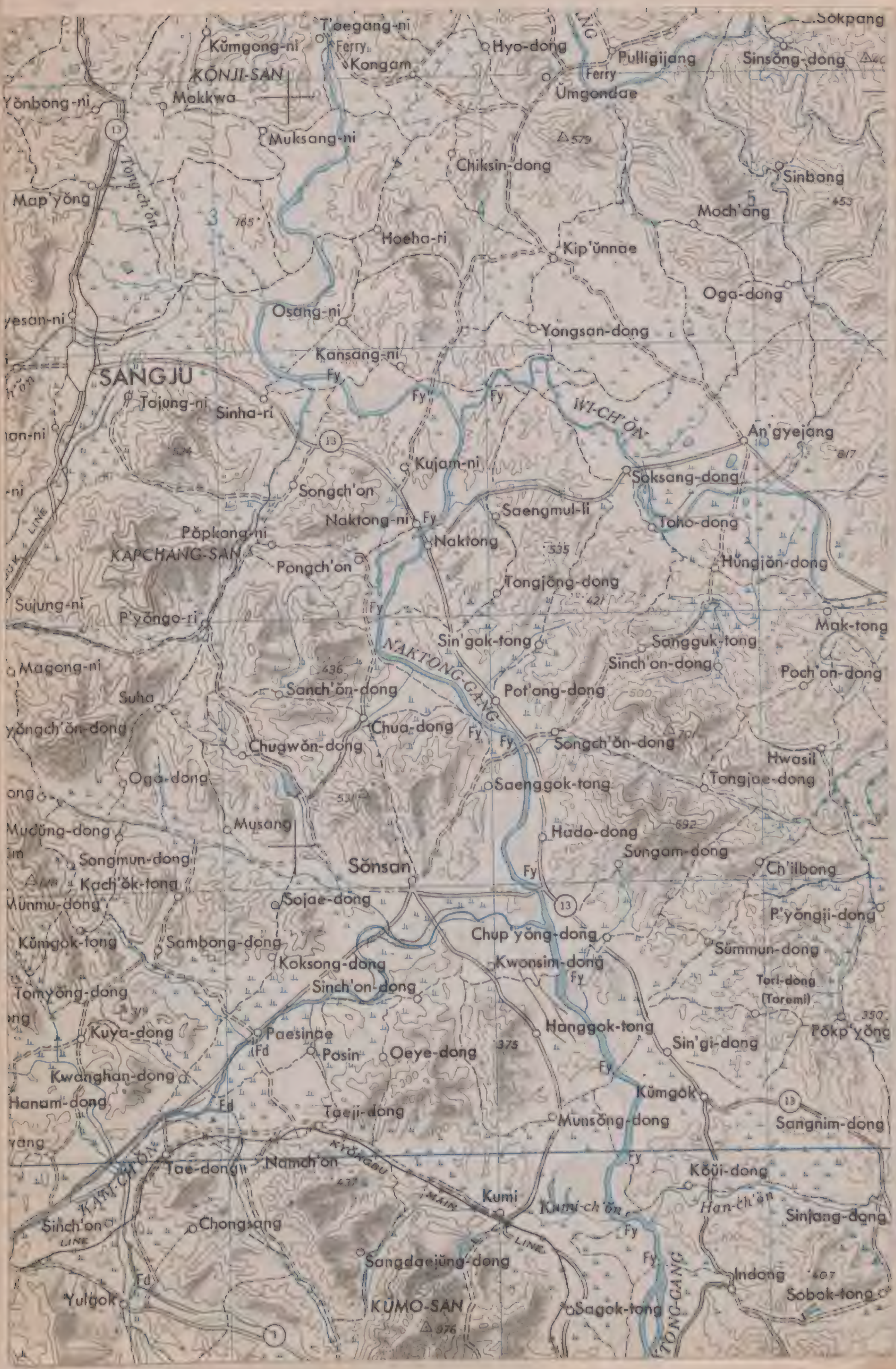
52 Death of large number of coconut trees, especially in ~~seaward~~ eastern half of island.

53 Occupation of some available habitats by weeds — i.e. ~~[illegible]~~ Carica, Tacca ~~and~~ Morinda in understory, grasses and other weeds in openings left by dead coconut trees.

54 Succession after death of numbers of coconuts, leaving open areas — Lepturus and Boerhavia, to Triumfetta, to Scaevola, to coconuts.

55 Establishment of dense understory of coconut seedlings in plantation after neglect of copra-making.

56 Clearing of this, probable burning of trash. (inferred)


T'aegang-ni
Ferry
Kŭmgong-ni
Kongam
KŎNJI-SAN
Mokkwa
Yŏnbong-ni
Muksang-ni
Hyo-dong
Pulligijang
Ferry
Ŭmgondae
Sinsŏng-dong
Sŏkpang
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Chiksin-dong
Sinbang
453
Moch'ang
Map'yŏng
Tong-ch'ŏn
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Toho-dong
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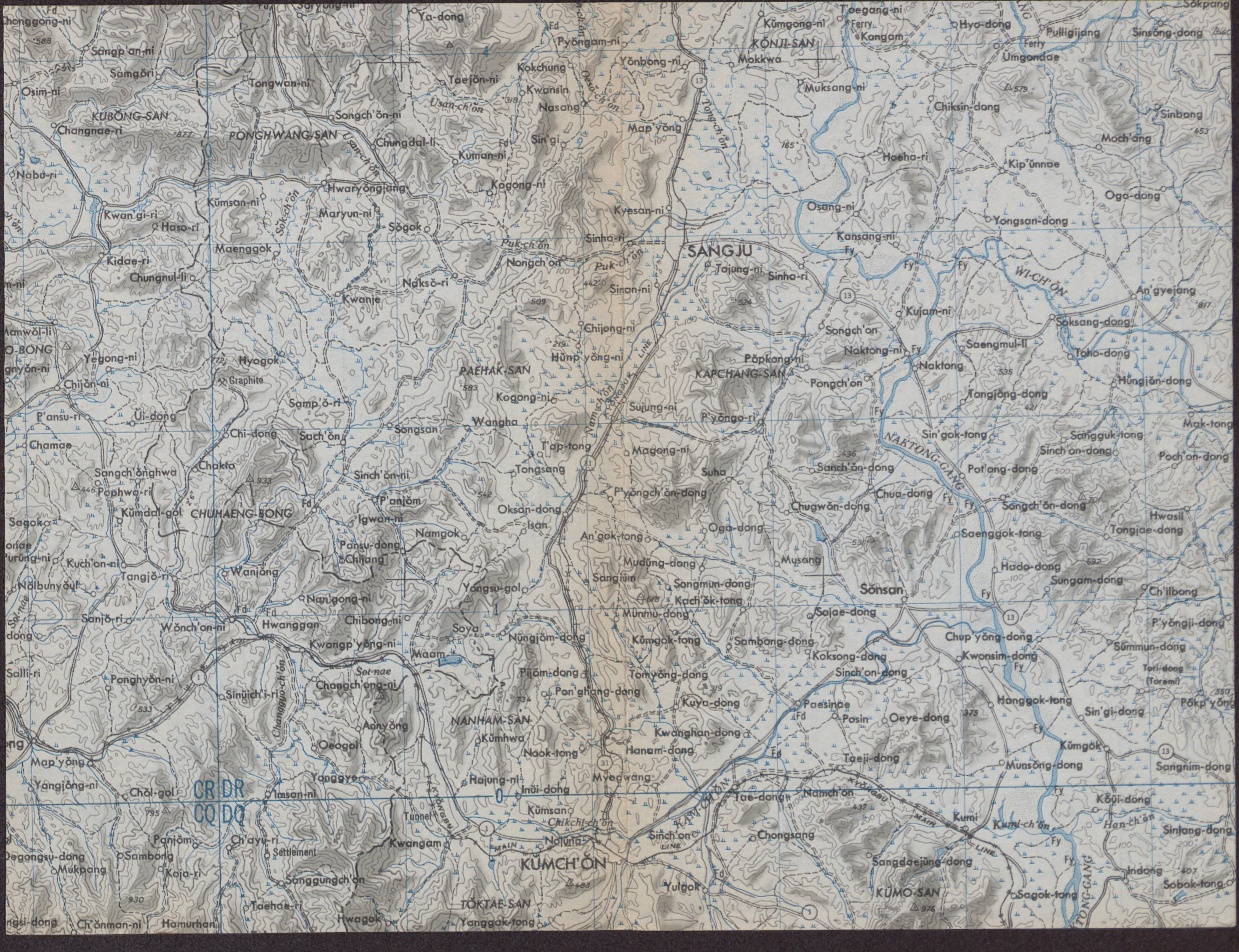
KUMO-SAN
Sagok-tong
NAKTONG-GANG
Sobok-tong
976
1


Chonggong-ni
Ya-dong
Sangp'an-ni
Samgŏri
Osim-ni
KUBONG-SAN
Changnae-ri
PONGHWANG-SAN
Tongwan-ni
Songch'ŏn-ni
Chungdal-li
Nabu-ri
Kwan'gi-ri
Haso-ri
Kidae-ri
Chungnul-li
Kŭmsan-ni
Maenggok
Hwaryŏngjang
Maryun-ni
Sŏgok
Taejŏn-ni
Kokchung
Kwansin
Nasang
Usan-ch'ŏn
Sin'gi
Kuman-ni
Kogong-ni
Pyŏngam-ni
Yŏnbong-ni
Map'yŏng
Kyesan-ni
Sinha-ri
Puk-ch'ŏn
Nongch'ŏn
Naksŏ-ri
Kwanje
Sinan-ni
Chijong-ni
Hŭnp'yŏng-ni
PAEHAK-SAN
Kogong-ni
Wangha
Songsan
Sach'ŏn
Samp'ŏ-ri
Manwŏl-li
O-BONG
Yegong-ni
Chijŏn-ni
Hyogok
Graphite
P'ansu-ri
Ŭi-dong
Chi-dong
Chamae
Sangch'ŏnghwa
Chakto
Pophwa-ri
Kŭmdal-gol
CHUHAENG-BONG
Sagok
Puryung-ni
Kuch'on-ni
Tangjŏ-ri
Wanjŏng
Nŏlbunyŏul
Sanjŏ-ri
Wŏnch'on-ni
Hwanggan
Salli-ri
Ponghyŏn-ni
Sinŭich'i-ri
Changgyo-ch'ŏn
Map'yŏng
Yangjŏng-ni
Chŏl-gol
Imsan-ni
Panjŏm
Degongsu-dong
Sambong
Mukpang
Koja-ri
Taehae-ri
Ch'ŏnman-ni
Hamurhan
Sinch'ŏn-ni
P'anjŏm
Igwan-ni
Namgok
Pansu-dong
Chijang
Nan'gong-ni
Chibong-ni
Kwangp'yŏng-ni
Maam
Sot-nae
Changch'ong-ni
Annyŏng
Oegogi
Yanggye
Tunnel
Kwangam
Ch'ayu-ri
Settlement
Sanggungch'ŏn
Hwagok
Yongsu-gol
Soya
Nŭngjŏm-dong
Pijŏm-dong
Pon'ghang-dong
NANHAM-SAN
Kŭmhwa
Naok-tong
Hajung-ni
Inŭi-dong
Kŭmsan
Chikchi-ch'ŏn
Nojung
KŬMCH'ŎN
TŎKTAE-SAN
Yanggak-tong
T'ap-tong
Tongsang
Oksan-dong
Isan
Namch'ŏn
KYŎNGBU LINE
SANGJU
Tojong-ni
Sinha-ri
Sujung-ni
Magong-ni
P'yŏngch'ŏn-dong
An'gok-tong
Mudŭng-dong
Sangjŭm
Songmun-dong
Kach'ŏk-tong
Munmu-dong
Kŭmgok-tong
Sambong-dong
Tomyŏng-dong
Kuya-dong
Kwanghan-dong
Hanam-dong
Myegwang
Kŭmgong-ni
KŎNJI-SAN
Mokkwa
T'oegang-ni
Ferry
Kongam
Muksang-ni
Tong-ch'ŏn
Osang-ni
Kansang-ni
KAPCHANG-SAN
P'ŏpkang-ni
Songch'on
Pongch'on
P'yŏngo-ri
Suha
Oga-dong
Musang
Sanch'ŏn-dong
Chugwŏn-dong
Chua-dong
Sŏnsan
Sojae-dong
Koksong-dong
Sinch'on-dong
Paesinae
Posin
Oeye-dong
Taeji-dong
Tae-dong
Namch'on
Sinch'on
KAM-CH'ŎN
MAIN LINE
Chongsang
Yulgok
Sangdaejŭng-dong
KŬMO-SAN
Kumi
Kumi-ch'ŏn
Sagok-tong
Hyo-dong
Pulligijang
Ŭmgondae
Sinsŏng-dong
Sŏkpang
Chiksin-dong
Sinbang
Moch'ang
Hoeha-ri
Kip'ŭnnae
Oga-dong
Yongsan-dong
WI-CH'ŎN
An'gyejang
Kujam-ni
Soksang-dong
Toho-dong
Naktong-ni
Naktong
Saengmul-li
Hŭngjŏn-dong
Tongjŏng-dong
Mak-tong
Sin'gok-tong
Sangguk-tong
Sinch'on-dong
Poch'on-dong
NAKTONG-GANG
Pot'ong-dong
Songch'ŏn-dong
Hwasil
Saenggok-tong
Tongjae-dong
Hado-dong
Sungam-dong
Ch'ilbong
P'yŏngji-dong
Chup'yŏng-dong
Kwonsim-dong
Sŭmmun-dong
Tori-dong
(Toremi)
Hanggok-tong
Sin'gi-dong
Pŏkp'yŏng
Kŭmgŏk
Sangnim-dong
Munsŏng-dong
Kŏŭi-dong
Han-ch'ŏn
Sinjang-dong
Indong
Sobok-tong
TONG-GANG
Fd
Fy
CR DR
CQ DQ
13
31
1

⊙ ~~H~~V ASTRO STATION

1 - 2.05 LOW

2 - 4.46

3 - 3.26

4(HV) - 0.57

5 - 5.92

6 - 5.44

7 - 7.12 ⊙

8 - 5.39

3° F(HV) - 3.65

9 - 6.20

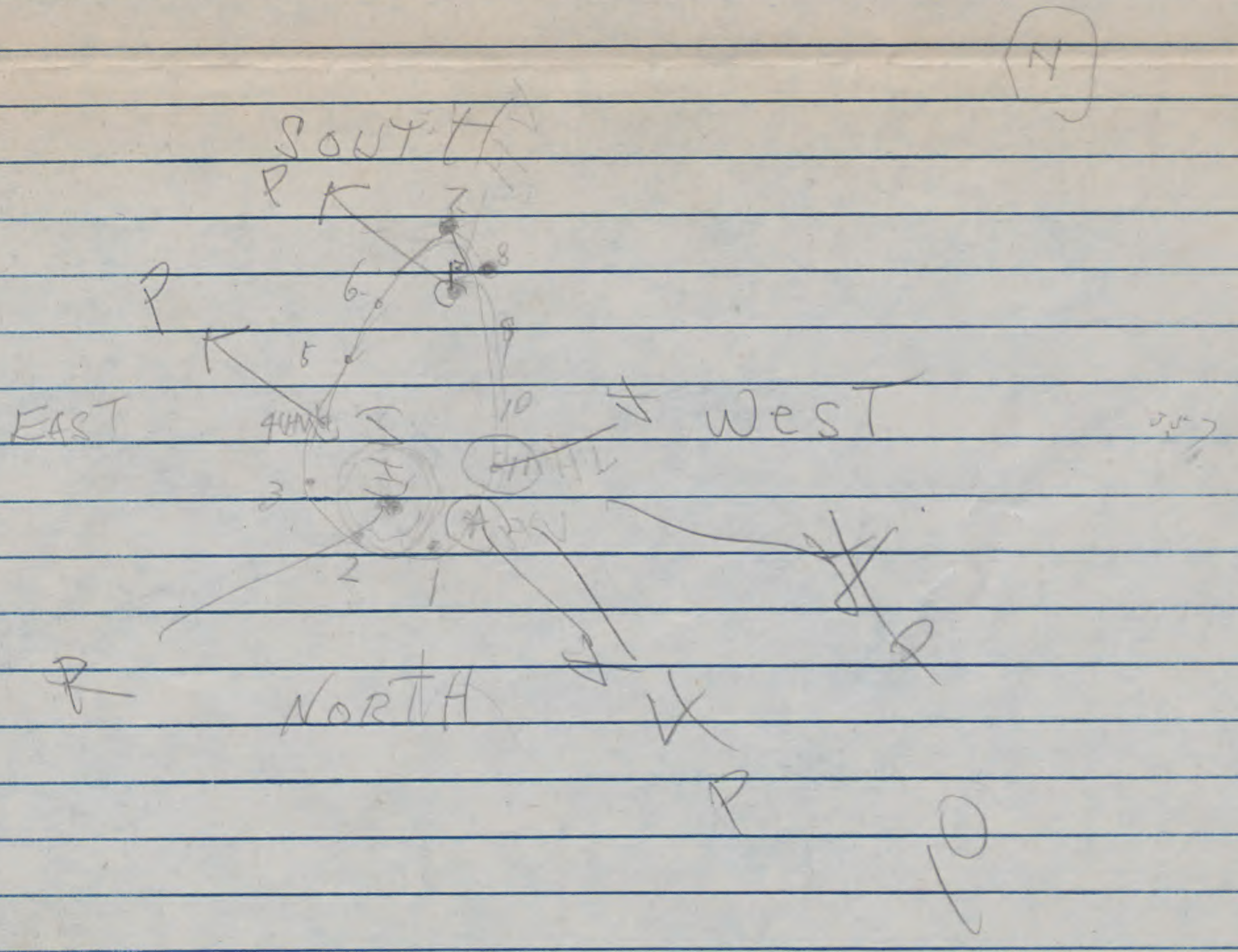
10 - 6.04

11(HV) - 0.62

HV = bench marks.
figures are all below the astro station.

On ship get elev. of Astro Sta. above sea level
also pricks on photo for loc. of b.m.

AO


N
SOUTH
P
K
7
8
6
F
P
K
5
9
EAST
4HV
10
WEST
0.57
HV
3
A
HV
2
1
P
NORTH
P
P